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# **COURSE OF INSTRUCTION**

**Graduate Programs**

## Course of Instruction

Courses numbered: 400-499

—Open to graduate students and to qualified undergraduates. [I.E. These are Graduate Classes that are open to qualified undergraduates with departmental permission]

Courses numbered: 500 and above

—Open to graduate students only

Student experience may suggest exceptions are warranted. In those instances, students should consult with their advisors. Deans have authority to approve exceptions.

Some graduate courses are offered every year, but many are scheduled over a two-year or three-year cycle. It is, therefore, essential that graduate students should carefully plan entire programs with their graduate advisors so that they will be able to register for all required courses over the time span in which they expect to complete the degree. The University reserves the right to limit the number of students registered in any graduate course, and also the right to cancel any course for which there is insufficient enrollment.

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## Accounting

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ACCOUNTING 400

### Financial Accounting

This course is an introduction to American financial accounting principles based on FASB and IASB, including the measurement, processing, and communication of accounting information. Users of such accounting information include business owners, managers, creditors, prospective investors, and others interested in the financial condition of an entity and the results of its operations. Topics covered include the accounting cycle, merchandising, services, fixed assets and corporate accounting issues. Prerequisite: Admission to graduate study.

3 semester credits

ACCOUNTING 500

### Accounting, Business Law & Ethics

The course focuses the fundamentals of Accounting, and also, how the legal and ethical environment of business impacts business decisions. There is an introduction to the basic principles of Accounting: how to account for business transactions. Emphasis on the understanding of how financial statements are prepared, and how they are used as a basis for decision making by business owners, and others interested in the financial condition of an economic entity and the results of its opera-

## Accounting

tions. The Law component introduces how the legal environment of business impacts business decisions with broad ethical, and critical thinking examples throughout. Knowledge of the legal aspects of running a business will enable the student to conduct business within the legal framework and understand the ethical dimension of business decisions. Topics include: Introduction to Business Ethics; Financial Regulation (Sarbanes-Oxley, Dodd-Frank) Business Crimes, Torts, and Contracts; the Constitution and Government Regulation of Business; Business Organizations; Employment and Labor Laws; Consumer Protection and Environmental Regulation; and Ethical Conflicts including Corporate Loyalty v. Whistleblowing, and Privacy and Technology. Broad ethical critical thinking will be examined using legal cases, decisions, essays and articles.

3 semester credits

ACCOUNTING 505

### Managerial and Cost Accounting

This course provides an introduction to managerial and cost accounting used by management in conducting daily operations, planning future operations, and developing overall business strategies. The objective is to gain an understanding of the role of accounting in the management process of planning, directing, controlling, and improving the organization's objectives (goals) and to translate those objectives into a course of action. Prerequisites: ACCT 400 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

ACCOUNTING 510

### Intermediate Accounting

This course applies generally accepted accounting principles to the preparation of financial statements, including balance sheets, income statements, statement of cash flows, and retained earnings statements. Accounting for leases, employee benefits, deferred taxes and other specialized accounting topics will also be explored. Prerequisites: ACCT 400 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

ACCOUNTING 520

### Auditing

This course examines laws and methods for conducting commercial audits. Ethics, attestation standards, controls and fraud detection are among the topics that will be discussed. Application of generally accepted accounting practices to the review of financial statements,

as well as the responsibility of the certified public accountant to the various users of the statements will also be explored. Prerequisites: ACCT 400, ACCT 510 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

ACCOUNTING 530

### Personal Taxation

This course is an overview of the major types of personal taxes used by governments to raise revenue. Emphasis is placed on the taxation of individuals and tax planning considerations for the individual. Prerequisites: ACCT 400 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

ACCOUNTING 535

### Business Entity Taxation

This course is an overview of the major types of corporate and business entity taxes used by governments to raise revenue. An emphasis is placed on the tax issues of different business forms, tax management and tax planning considerations for the business entity. Prerequisites: ACCT 400, ACCT 530 and completion of all required Accounting concentration courses or concurrent registration in final required concentration courses.

3 semester credits

ACCOUNTING 540

### Advanced Financial Accounting

This course is an overview of selected accounting topics of interest to international business students. Topics include current practice in accounting for business mergers or acquisitions, accounting for stock investments in affiliated companies, an introduction to consolidated financial statements, accounting for branch operations and an introduction to accounting for state and local governmental units. Prerequisites: ACCT 400, 510 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

ACCOUNTING 545

### Financial Reporting and Analysis

This course is an overview of generally accepted accounting principles underlying the content of financial statements including alternative inventory valuation methods, lease accounting, segment reporting and reporting for employee benefit plans. Students study and analyze corporate annual reports and government and not-for-profit financial statements. Prerequisites: ACCT 400, ACCT 510, ACCT

## Accounting • Acupuncture

540 and completion of all required accounting concentration courses or concurrent registration in final required concentration courses.

*3 semester credits*

ACCOUNTING 555

### Advanced Auditing

This course provides understanding of laws and methods for conducting audits. It includes reviewing the engagement to provide reasonable assurance the audit objectives are achieved. It also includes evaluation of information obtained to reach and to document engagement conclusions including: performing analytical procedures, evaluating the sufficiency and competence of audit evidence and document engagement conclusions, and reviewing the work performed to provide reasonable assurance the objectives are achieved. It also develops proficiency in preparing communications to satisfy engagement objectives including: preparing reports, preparing letters and other required communications, and other related matters. The course prepares students to pass the CPA exam and to do professional audits. Prerequisite: Undergraduate degree and approval of the State of Connecticut to take the CPA exam. Offered Annually

*3 semester hours*

ACCOUNTING 556

### Accounting Regulations

This course provides the required knowledge for accountants in federal taxation and business law. The curriculum provides a working knowledge of federal taxation of individuals, corporations, partnerships, estates and trusts. It covers the concepts of business law, debtor-creditor relationships, government securities acts, employment regulations and environmental regulations. It also provides knowledge of professional and legal responsibilities including professional conduct of accountants. The course curriculum includes all of the CPA exam materials. Prerequisite: Undergraduate degree and accounting courses to qualify to sit for the CPA exam. Offered Annually

*3 semester hours*

ACCOUNTING 557

### Business Environment & Concepts for Accountants

This course will provide current knowledge in the business environment as it relates to the accounting profession. By the end of the course the student should have professional competency in corporate governances, economic concepts and analysis, financial management, information systems and communications, strategic planning and operations

management.

*3 semester hours*

ACCOUNTING 558

### Financial Accounting & Reporting

This course provides an in-depth overview of selected advanced accounting topics required in the accounting profession. By the end of the course, the student should have professional competency in performing accounting work related to the four financial statements: balance sheet, income statement, equity statement, and statement of cash flows. In addition, the course will address the issues of partnerships, business combinations, governmental accounting, and non-profit accounting.

*3 semester hours*

ACCOUNTING 560

### International Accounting

This course examines the diverse accounting practices employed by different countries and their effects on multi-national firms' operation, as well as efforts to standardize IASB/FASB rules. Performance evaluation in multinational enterprises, impact of differences in national accounting principles and practices, and accounting under central planning is also examined. Discussion topics include the critical problem areas such as taxation, transfer pricing, financial planning, and information systems within an international framework. Prerequisites for Accounting: ACCT 400 and completion of all required accounting concentration courses or concurrent registration in final required concentration courses. Prerequisites for International Business: ACCT 400 and completion of all core courses or concurrent registration in final required core courses.

*3 semester credits*

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## Acupuncture

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### Acupuncture Practice and Techniques (APT)

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APT 511

#### Point Location 1

This course will serve as the foundation of the acupuncture point selection series. Meridian theory using concepts of the Jing Luo system, including main and secondary vessels will be reinforced. This course provides the student with the knowledge and skills to physically locate acupuncture points of the lung, large intestine, stomach and spleen, heart and small intestine, urinary bladder, kidney, and pericar-

dium channels. Students will focus on how to locate points effectively, accurately, and quickly as preparation for clinical application as well as college and national examinations. Students will also learn the major function(s) and indication(s) of the Lung, Large Intestine, Stomach, Spleen, Heart, Small Intestine, Urinary Bladder, Kidney and Pericardium channel points. Co-requisite/Prerequisite: ATD 513 TCM Diagnosis 1, ABS 511 Anatomy 1.

*1.5 lecture hours, 1 laboratory hour, 2 semester credits.*

*Offered: Fall and summer semesters*

APT 523

#### Point Location II

This is a continuation of the previous course and will focus on the Triple Warmer, Gall Bladder, Liver, Governing Vessel ("Du"), Conception Vessel ("Ren") and extra points. Additional instruction is given in regional point selection and point combinations. Prerequisites: ATD 513 TCM Diagnosis 1, ABS 511 Anatomy 1.

*1.5 lecture hours, 1 laboratory hour, 2 semester credits.*

*Offered: Spring and summer semesters*

APT 512

#### Meridian Theory

Meridian (a.k.a. Channel) theory is the basis of diagnosis and acupuncture treatment. This course is designed to provide the necessary instruction and training for the student to be familiar with meridian theory including regular, extra and other meridian systems. Corequisite/Prerequisites: ATD 512 TCM Theory and ATD 513 TCM Diagnosis 1.

*2 lecture hours, 2 semester credits.*

*Offered: Fall and summer semesters*

AWB 501

#### UBAI Clinic Safety Procedures

This course prepares the student for being able to perform in the UBAI clinic. HIPAA, Occupational Safety and Health Administration (OSHA) standards, UBAI clinic specific safety practices and procedures are presented. The student will practice safe and proper needle removal, pole moxibustion, and electrical stimulation needle techniques. The student will be shown and will practice clinic room set and clean-up procedures and patient draping. A review of fire safety and personal safety procedures will be offered. Completion of this course and passing the clinic HIPAA and OSHA BBP quizzes is required before performing any duties in the UBAI clinic. Prerequisites: none.

*0.5 lecture hours, 0.5 semester credits.*

*Offered Fall and Spring semesters.*

# Acupuncture

AWB 521

## TCM Safe Practices

This course prepares the student for emergency situations both in and out of the office. CCAOM Clean Needle Technique and a review of Occupational Safety and Health Administration (OSHA) standards are presented. In addition the student will practice safe and proper needling, moxibustion, bleeding, electrical stimulation and cupping techniques. Allopathic treatments along with natural remedies for common complications of acupuncture and related therapies are discussed. CPR certification in emergency procedures is achieved. Prerequisites: none.

*1.5 lecture hours, 1.5 semester credits.*

*Offered: Spring and summer semesters*

APT 614

## Acupuncture Techniques I

This course covers the basic principles of acupuncture treatment for diseases involved with different pathogenic factors, tissues and organs. Special point selection based on Root-Branch, Origin-End, Path of Qi, Five Element and Eight Parameter diagnoses are covered. Indications and contraindications of moxibustion, scalp acupuncture and electrical acupuncture stimulation are covered. Prerequisites: APT 511 and APT 523: Point Location I and II.

*2 lecture hours, 2 laboratory hours, 3 semester credits.*

*Offered: Fall semester*

APT 625

## Acupuncture Techniques II

This course covers functions, indications and needling methods of the Well, Spring, Stream, River, Sea, Source, Luo, Xicleft, Back Shu, Front Mu and Lower He-Sea, Eight Influential, Eight Confluent and important crossing points. Continuing practice in needling, moxibustion and cupping techniques is included. In addition, the prevention and treatment of acupuncture complications is covered. Prerequisite: APT 614 Techniques I.

*2 lecture hours, 2 laboratory hours, 3 semester credits.*

*Offered: Spring semester*

APT 626

## Auricular & Scalp Acupuncture

This course introduces the student to various forms of microsystem acupuncture, focusing on auricular and scalp systems. The student learns the respective maps of the scalp and ear, clinical applications and treatment strategies. Corequisite/Prerequisite: APT 614 Acupuncture Techniques I,

*1 lecture hour, 1 semester credit.*

*Offered: Spring semester*

APT 718

## Pediatric Acupuncture

The special diagnostic and treatment skills required for the treatment of patients less than 12 years of age are discussed. The balance of safety for the patient and treatment efficacy is emphasized. Prerequisite: ATD 524.

*1 lecture hour, 1 semester credit.*

*Offered: Spring semester*

APT 637

## Japanese Acupuncture Techniques

This course covers the unique treatment strategies and protocols developed by Japanese acupuncture masters. Prerequisite: APT 614 Acupuncture Techniques I.

*1 lecture hour, 1 semester credit.*

*Offered: Summer semester*

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## Asian Medicine Theory, Diagnosis and Application (ATD)

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ATD 511

## TCM History and Philosophy

The student studies the different eras of Chinese history and the effects on TCM Medicine theories. This course includes the study of the development of Naturalism, Philosophical and Religious Taoism, Confucianism, and Buddhism and their contributions to Chinese Medicine. For each philosophy, the course examines how the philosophy views the human relationship to nature, and the human relationship to the universe. In addition, the impact of philosophy and religion on the TCM medical paradigm is explored. Prerequisite: none.

*1 lecture hour, 0 laboratory hours, 1 semester credit.*

*Offered: Fall and summer semesters*

ATD 512

## TCM Medical Theory

This course includes the classic theories of yin and yang and the Five phases that are fundamental to understanding the TCM medical relationship between humans and the universe. Normal physiology is studied through the fundamental substances (Qi, Blood, Essence, Spirit and bodily fluids), and organs. The basic theory of illness and diagnosis using four examinations (sight, listening and smelling, palpation, and asking) and Eight parameters are covered. Prerequisites: Anatomy and Physiology.

*2 lecture hours, 2 semester credits.*

*Offered: Fall semester*

ATD 513

## TCM Diagnosis I

The basic theory and characteristics of the pathogenesis and pathogenic factors are covered including the seven emotions, disharmony of Yin and Yang, abnormalities in Qi, Blood, Spirit, Essence and Bodily fluids, and organ disharmonies are covered. Techniques in inquiry, palpation, tongue and pulse diagnosis are covered. Diagnoses incorporating the eight parameters as well as root and stem concepts are covered for each of the twelve zang-fu. Prerequisite/Co-requisite: ADT 512 TCM Medical Theory.

*2 lecture hours, 2 semester credits.*

*Offered: Fall semester*

ATD 524

## TCM Diagnosis II

This course will provide the student with further understanding of TCM Medicine diagnosis, expanding on concepts from TCM Diagnosis I. Traditional Chinese Medicine organ diagnoses, eight principle and febrile disease diagnoses will be stressed. In addition, treatment principles and acupuncture treatments based on these diagnostic systems will be explored. Differential diagnoses of common disease entities will be explored. Students will also continue to practice pulse and tongue diagnosis. Prerequisite: ADT 513 TCM Diagnosis I.

*2 lecture hours, 2 semester credits.*

*Offered: Spring semester*

ATD 515

## Seminar 1

This course will help the student to negotiate their first year in the Acupuncture program. The student will be guided through overviews of Chinese Medicine as preparation for integrating material from the entire curriculum. The student will review and update Chinese Medical terminology as well as the range of resources and the different perspectives on this terminology and the concepts contained therein. Diagnostic practical skills such as pulse and tongue diagnosis will be reviewed in a practical group setting. In addition the student will apply concepts of information literacy and its use for analysis of case studies. Prerequisites: ATD 513.

*1 lecture hour, 1 semester credit.*

*Offered: Spring semester*

ATD 526

## Seminar 2

This course will be a continuation of seminar one. The student will be guided through the application and integration of concepts and skills acquired in the first and second semester

# Acupuncture

curricula. The student will apply these through the use of case studies and clinical examples. The basics of applying diagnosis and generation of treatment principles will be reinforced in a collegial setting. Group activities such as case analysis, pulse and tongue analysis and grand rounds will also be reviewed with a deepening understanding of clinical applications of such. Prerequisites: ATD 515.

*1 lecture hour, 1 semester credit.*

*Offered: Fall semester*

ATD 617

## Second Year Seminar 1

This course will help the student understand case study and to begin learning the skills necessary to become an AOM clinical practitioner. The student will be guided through case study and case analysis as utilized in clinical practice as preparation for integrating material from the entire curriculum into the clinical setting. Case presentations and clinical skills are emphasized through a problem based learning format using TCM principles as the foundation. In addition, the student will gain a basic understanding of the ethical and legal issues surrounding licensed practice in the field of acupuncture. Prerequisites: ATD 526.

*1 lecture hour, 1 semester credit.*

ATD 618

## Seminar 3

This course will be a continuation of the second year seminar one. The student will be guided through the application of case analysis, integrative patient care, diagnostic, assessment and treatment application skills acquired in clinical observation and the first year's curriculum. The student will begin applying these through analyzing clinical cases. Advanced applications in 8-parameter, 5-element, zang-fu, wen bing and shan han lun diagnosis and treatment principles will be reinforced in a collegial setting using interdisciplinary case analysis and grand rounds. Prerequisites: ATD 617.

*1 lecture hour, 1 semester credit.*

*Offered: Fall semester*

ATD 711

## Differential Diagnosis and Pathomechanisms

This course compares and contrasts diagnosis and treatment between Western and TCM diagnoses. Western medical diagnosis of these diseases is incorporated so that the student is able to collaborate with western physicians. Major and common categories of diseases including respiratory tract, infectious, gastrointestinal, genitourinary and musculoskeletal diseases are covered. Prerequisite: ADT 513 TCM Diagnosis I.

*2 lecture hours, 2 semester credits.*

*Offered: Fall and summer semester*

ATD 715

## TCM Internal Medicine

This course focuses on the diagnosis and TCM treatment of major illness. Treatment planning includes acupuncture, qi gong, and massage. Diagnoses cover respiratory illnesses, gastrointestinal, genitourinary, gynecological, and psychological illnesses. Root-stem, Meridian, Substance and 5 Element treatments are included. Prerequisite: ATD 513 TCM Diagnosis I.

*2 lecture hours, 2 semester credits.*

*Offered: Fall semester.*

ATD 717

## Advanced Tongue and Pulse Diagnosis

This course is designed to increase the diagnostic skills and clinical applications of these uniquely TCM diagnostic parameters. The student studies healthy and diseased tongues and pulses and discusses how findings in these areas change the treatment principles and strategies. Case studies from the clinical rotations are used to increase both depth and breadth of skill. Prerequisite: ADT 524: TCM Diagnosis II.

*1 lecture hour, 1 semester credit*

*Offered: Spring semester*

ATD 727

## Case Studies 1

The student will be guided through case study, case analysis and pattern differentiation as utilized in clinical practice as preparation for integrating material from the entire curriculum into the clinical setting. Case presentations and clinical skills are emphasized through a problem based learning format using TCM principles as the foundation. Emphasis for this class is on cases associated with problems of fluid dynamics, meridian diagnoses and chronic pain, which are frequent chief complaints in the TCM clinical setting. Prerequisite: ATD 526.

*1 lecture hour, 1 semester credit*

*Offered: Spring semester*

ATD 728

## Case Studies 2

Students learn to transition from the development of pattern diagnosis to TCM treatment principles which then lead to point and modality applications. Emphasis is placed on an accurate assignment of symptoms to pattern diagnosis; logical treatment principles reflecting the priorities and totality of the patterns diagnosis; and the most efficacious acupuncture point and adjunctive modality prescriptions to help the patient achieve health. Prerequisite:

ATD 524 TCM Diagnosis II.

*1 lecture hour, 1 semester credit.*

*Offered: Fall and summer semesters*

ATD 729

## Acupuncture Gynecology

This course is designed to familiarize the student with TCM diagnosis and acupuncture treatments of common gynecologic conditions. Special emphasis is placed on understanding those points forbidden to needle or moxa in cases where the patient's pregnancy status is unknown. Prerequisite: ADT 524: TCM Diagnosis II.

*1 lecture hour, 1 semester credit.*

*Offered: Fall and summer semesters*

ATD 742

## TCM Geriatrics

This course is designed to familiarize the student with TCM diagnosis and acupuncture treatments that apply to elderly patients. Special emphasis is placed on understanding the physiological changes that affect the health of the elderly from both a TCM and biomedical perspective. Acupuncture and herbal treatments, their indications and contraindications will be discussed. Prerequisites: ADT 524 TCM Diagnosis 2, ATD 728 Case Study 2, ACH 635 CH Formulae 1.

*1 lecture hour, 1 semester credit*

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## Western Biomedicine (AWB)

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ACS 511

## Evidence-Informed Clinical Practice in Acupuncture

The basic principles of clinical and laboratory research are examined with a special emphasis on the applications of acupuncture and TCM techniques in the research setting. Application of research to case evaluation will be emphasized. Prerequisite: none.

*1 lecture hour, 1 semester credit.*

*Offered: Fall semester*

AWB 621

## Medical Ethics

This course is designed to provide the student with a basic understanding of the ethical issues surrounding practice in any medical field. Upon completion of this course, the student will be able to identify concepts of medical and professional ethics as they apply to the practice of health care. Prerequisite: none.

*1 lecture hour, 1 semester credit.*

*Offered: Spring semester*

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ABS 511

## **Anatomy 1**

This course provides an in-depth study of the macroscopic human anatomy and covers the structure of the trunk and neck regions. Clinical aspects of the vascular and neurological relationships of these regions are emphasized. Instruction includes lectures and interactive media software. Prerequisite: none.

*4 lecture hours, 4 semester credits.*

*Offered: Fall semester*

ABS 522

## **Anatomy 2**

This course is a continuation of Anatomy 1 and covers the structure of the head and extremities. Clinical aspects of the neurological and vascular relationships of these regions is emphasized. Prerequisite: ABS 511 Anatomy 1.

*4 lecture hours, 4 semester credits.*

*Offered: Spring semester*

ABS 515

## **Physiology 1**

This course emphasizes the function of cellular structures which regulate homeostasis as well as their role in cell division and genetic control of protein synthesis. Emphasis is placed on the role of the cell membrane in the control of cellular events. The effects of physiology on hormones, their role in homeostasis, and the functional changes associated with homeostasis are considered. Prerequisite: none.

*2 lecture hours, 2 semester credits.*

*Offered: Fall semester*

ABS 525

## **Physiology 2**

This course is a study of physiology at the organ and systems level. Included is the study of the circulatory, respiratory, renal, cardiovascular, gastrointestinal and urogenital systems. Also included is the study of the endocrine system and its interrelationships with various organs and systems. There is an integration of normal physiology with pathophysiology and clinical concepts. Prerequisite: ABS 515.

*2 lecture hours, 2 semester credits.*

*Offered: Spring semester*

AWB 523

## **Pharmacology**

This course examines the most commonly used pharmacologic agents to be encountered in the clinical setting. The general principles of pharmacology (pharmacodynamics and pharmacokinetics) are covered. Uses and side effects of antibiotics, anti-inflammatory agents, hormones and cardiac drugs are surveyed. Drug-nutrient and drug-herb interactions are

discussed. Prerequisite: none.

*1 lecture hour, 1 semester credit.*

*Offered: Spring semester*

AWB 522

## **Research Methodology**

The basic principles of clinical and laboratory research are examined with a special emphasis on the applications of acupuncture and TCM techniques in the research setting. Prerequisite: none.

*1 lecture hour, 1 semester credit.*

*Offered: Fall semester*

ACS 611

## **Pathology 1**

This course is a study of the pathophysiological process and how this process alters the gross, microscopic and clinical manifestations of disease. Basic pathological processes of inflammation, repair, degeneration, necrosis, immunology and neoplasia are presented. Prerequisite: ABS 525 Physiology 2.

*2 lecture hours, 2 semester credits.*

*Offered: Fall semester*

ACS 624

## **Pathology 2**

This course is the continuation of the pathological processes of various diseases. This course emphasizes the basis of systemic diseases of the cardiovascular, respiratory, gastrointestinal, urogenital, endocrine, hepatobiliary, renal and pancreatic systems. Prerequisite: ACS 611 Pathology 1.

*4 lecture hours, 4 semester credits.*

*Offered: Spring semester*

ACS 612

## **Clinical Diagnosis 1**

This course covers the techniques used for physical examination for various systems of the body. Skills taught develop an appreciation for normal variations and abnormalities associated with disease states. The student is taught to recognize the signs and symptoms of common diseases. Prerequisites: ABS 511, ABS 522, ABS 515.

*3 Lecture hours, 2 lab hours, 4 semester credits.*

*Offered: Fall semester*

ACS 623

## **Clinical Diagnosis 2**

This course is a continuation of Clinical Diagnosis 1. Prerequisite: ACS 612.

*3 lecture hours, 2 lab hours, 4 semester credits.*

*Offered: Spring semester*

ACS 724

## **Public Health**

This course covers current environmental and public health concerns with an emphasis on the role of the acupuncturist in these issues. The course integrates health with diet, water and air pollutants, noise and substance abuse. Recognition of major communicable diseases is included. Prerequisite: ABS 525 Pathology 2.

*2 lecture hours, 2 semester credits. (online course)*

*Offered: Spring semester*

ACS 613

## **Lab Diagnosis**

This course introduces the student to the appropriate use and interpretation of laboratory tests. Prerequisites: ABS 511 and ABS 525.

*2 lecture hours, 2 semester credits.*

*Offered: Fall semester*

ANT 521

## **Western Nutrition**

This course provides the foundation for therapeutic nutrition. It explores the biochemistry of macronutrients as well as vitamins and minerals. Deficiencies, toxicities, therapeutic uses and appropriate doses are examined. An assessment of dietary needs and the application of therapeutic nutrition in treating individual diseases and syndromes are also taught. Prerequisites: none.

*2 lecture hours, 2 semester credits.*

*Offered: Spring semester*

ACS 711

## **Diagnostic Imaging**

This course covers radiographic anatomy and diagnostic imaging techniques. A basic introduction to imaging, including roentgenology, computerized tomography (CT), magnetic resonance imaging (MRI), ultrasound, and bone scanning are discussed. The basic concepts of these techniques and their use in diagnosis are discussed. Prerequisites: Anatomy 2, Physiology 2.

ACS 625

## **Physical Exam Skills**

This course helps students develop the skills necessary to conduct screening physical exams and specialty exams useful in the ambulatory practice. The student will learn the appropriate exam and physical diagnostic procedures that correspond with the patient's chief complaint and medical history. Clinical decision making and identification of clinical red flags are emphasized. Physical examination skills: Cardio, Chest/Pulmonary, Abdomen/GI, Neuro, General screening exam, physical exam of

## Acupuncture

the spine, physical exam of the major joints (shoulder, elbow, hip, knee, foot). Prerequisites: ABS 525 (can take Clinical Dx 1 & 2 in either order).

ACS 626

### Laboratory Diagnosis 2: Nutritional and functional analyses

This course will educate the student on nutritional assessment to include health, diet and lifestyle history, physical measurements, and laboratory testing to include analysis of blood, stool, saliva and urine. The course will integrate use of these measurements in the design of an appropriate nutritional protocol for the client. The student will also learn effective client management and follow-up. Prerequisites: Clinical Dx 1, Lab Dx 1.

AWB 725

### Pharmacology 2

This course builds on the basic information in Pharmacology 1 to expand the student's understanding of pharmacology, including mechanisms of action; absorption, distribution, metabolism, and excretion (pharmacokinetics/pharmacodynamics); interactions with other drugs and with herbs/food; problems with special populations (prenatal, neonatal, elderly); rational drug usage for clinical disorders (therapeutics): clinical effects of drugs (by category); and toxicology.

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## Herbal Medicine Survey (AHM)

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AHM 521

### Botanical Medicine 1

This course comprises a survey of plant and plant preparations most commonly used in Western traditions. The actions of the plant and plant products, as well as drug-herb interactions are considered.

*3 lecture hours, 3 semester credits.*

*Offered: Fall semester*

AHM 599

### Homeopathy for Acupuncturists

The course will survey the basic theoretical principals upon which homeopathic practice is based as well as survey homeopathic remedies commonly used in acute care. Safety, legal and manufacturing issues will also be highlighted.

*2 lecture hours, 2 semester credits.*

AHM 613

### Traditional Chinese Dietetics

This class introduces the student to the eastern understanding of how food influences human health. Foods and food products are surveyed

according to Asian categorization. Food groups are categorized by nature, temperature, taste, element, indications and contraindications. Treatment of the major categories of organ (zang-fu) disorders using foods and food combinations are covered. Prerequisite: ADT 524.

*2 lecture hours, 2 semester credits.*

*Offered: Fall semester*

AHM 612

### Introduction to Chinese Herbal Remedies

This survey course introduces the student to the diagnostic and treatment strategies specific to TCM herbal therapies. The student is introduced to major herbs and formulas of China, their uses, contraindications and drug-herb interaction. Patient safety issues are also addressed. Prerequisite: ATD 524.

*1 lecture hours, 1 semester credit.*

*Offered: Fall semester*

AHM 713

### Patent Remedies

This course will survey over 150 prominent, TCM, topical and internal herbal, patent formulas. Students will be introduced to pattern-specific uses of these formulas and subsequently, their contraindications, toxicities and potential drug interactions. Safety, legal, and manufacturing issues will also be highlighted. Prerequisite: AHM 612: Introduction to Chinese Herbal Remedies.

*2 lecture hours, 2 semester credits*

*Offered: Spring semester*

AHM 634

### Dispensary Management

This course will develop knowledge and skills related to TCM dispensary management. Students will learn best practices for successfully and legally running a Chinese herbal dispensary. Combining lecture and experiential learning, students will become acquainted with dispensing practices, proper record-keeping, inventory management, and safety protocols for a well-organized TCM dispensary. Prerequisites: none

*1 lecture credit, 18 hours.*

*Offered: Summer semester*

AHM 635

### Pharmacognosy and Pharmacology of Chinese Herbs

Chinese material medical are often prescribed in complex formulae. Understanding the chemistry, interactions, extraction methodology, and drug interactions allows TCM practitioners better insights to possible adverse effects, from drug-herb interactions, herb toxicities to lack of expected (or any) outcomes from pre-

scribed formulae. Several recorded incidents of adverse reactions have occurred to Chinese herbs over the past 12 years. In most cases, the incidents have involved multiple patients consuming the same or similar substance, rather than isolated case reports. It is important to review the unique aspects of Chinese medicine) which are of relevance to understanding these issues. Prerequisites: ACH 523 Chinese Herbal Theories & Triple burner theories.

*1 lecture credit, 18 hours.*

*Offered: Summer semester*

AHM 616

### Ethical and Ecological Considerations of Chinese Materia Medica

The traditional practice of using endangered species (plant and animal) is controversial within TCM. Comprehensive Chinese herbal textbooks often discuss substances derived from endangered species, emphasizing alternatives. Poaching and black market issues with animal products, particularly tiger bone, rhinoceros horn, seahorse and bear bile have all raised ethical and ecological concerns in the use of Traditional Chinese formulae. In this course, we will discuss the ethical and ecological impacts of TCM materia medica on the health of the individual and the world. Prerequisites: none

*1 lecture credit, 18 hours*

*Offered: Fall semester*

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## Movement, Respiration and Bodywork Studies (AMR)

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AMR 511

### Taijiquan 1

This introductory course in therapeutic movement teaches the proper musculoskeletal alignment, breathing, and mental awareness affect the energy pathways by direct experience through practice of this traditional exercise. Prerequisite: none.

*1.5 laboratory hours, 1 semester credit.*

*Offered: Fall semester*

AMR 522

### Taijiquan 2

This course is a continuation of Taijiquan 1. In addition to more advanced Taijiquan exercises for Qi circulation, the student learns basic application of Chinese therapeutic movement to the clinic setting. Prerequisite: AMR 511 Taijiquan 1.

*1.5 laboratory hours, 1 semester credit.*

*Offered: Spring semester*

## Acupuncture

AMR 613

### **Qigong 1**

The student learns basic Qigong theory and techniques designed to regulate specific meridians, muscles, joints, and zangfu, as well as how to choose, integrate, and teach the appropriate exercises in a clinic setting. Prerequisite: AMR 522 Taijiquan 2.

*1.5 laboratory hours, 1 semester credit.*

*Offered: Fall semester*

AMR 624

### **Qigong 2**

This course is a continuation of Qi Gong 1. The student learns advanced exercises, meditations, and breathing exercises that can be applied both to the clinic setting as well as to the student's personal experience and development of Qi toward the goal of being a more effective TCM practitioner.

*1.5 laboratory hours, 1 semester credit.*

*Offered: Spring semester*

AMR 627

### **Tuina 1**

The student learns basic Tuina manipulation theory and techniques to treat acupoints, channels, and soft tissue as well as Qigong conditioning exercises that allow the student to implement Tuina manipulation safely and effectively. The course culminates in learning a Tuina full-body therapeutic protocol.

*1 lecture hour, 2 laboratory hours, 2 semester credits.*

*Offered: Summer semester*

AMR 715

### **Tuina 2**

This course is a continuation of Tuina 1. The student learns intermediate Tuina manipulation theory and techniques to treat acupoints, channels, and soft tissue. Tuina treatments for back pain and conditions of the upper limb are the primary focus. Prerequisite: AMR 627 Tuina 1.

*1 lecture hour, 2 laboratory hours, 2 semester credits.*

*Offered: Fall semester*

AMR 726

### **Tuina 3**

This course is a continuation of Tuina 2. The student learns advanced Tuina manipulation theory and techniques to treat acupoints, channels and soft tissue. Tuina treatments for the leg and internal conditions are the primary focus. Prerequisite: AMR 715 Tuina 2.

*1 lecture hour, 2 laboratory hours, 2 semester credits*

*Offered: Spring semester*

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## **Counseling, Communications and Practice Management**

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APS 621

### **Psychological Assessment**

The primary focus of this course is the diagnosis of the various psychiatric diseases according to the Diagnostic and Statistical Manual of Mental Disorders. Included are psychological assessment considerations and treatment modalities. Prerequisites: none.

*2 lecture hours, 2 semester credits*

*Offered: Spring semester*

APP 721

### **Practice Management**

Students are taught the current procedural practices for the operation of a private practice. In addition, the practical aspects of operating a practice as a small business are discussed. Students are encouraged to begin thinking about their personal career path as a complementary medicine practitioner in private practice, group practice, hospital-based practice or as an TCM educator. Prerequisites: none.

*2 lecture hours, 2 semester credits.*

*Offered: Spring semester*

APP 722

### **Professional Development**

This course will explore the issues associated with ongoing professional development. Professional development assists the AOM practitioner to develop the knowledge and skills necessary to further clinical competence and contribute to the body of knowledge in the field during practice after graduation. Prerequisites: ACS 731 Clinic Entry 1, ACS 631 Clinic 1.

*1.5 lecture credits, 0 lab credits, 1.5 credits total*

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## **ACH: Asian/Chinese Herbology**

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ACH 511

### **Chinese Formula and Constituents 1**

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on herbs from the Release Exterior, Clear Heat, and Drain Downwards categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Prerequisites: satisfactory

progress in first year curriculum from MSTCM program.

*2 lecture credits, 36 hours*

*Offered: Fall semester*

ACH 512

### **Chinese Formulae and Constituents 2**

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on Herbs from the Regulate Qi, Regulate and Invigorate Blood, Warm Interior and Expel Cold, Tonify (Qi and Blood) categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Prerequisites: ATD 524 TCM Diagnosis II.

*2 lecture credits, 36 hours*

*Offered: Fall semester*

ACH 523

### **Chinese Formulae & Constituents 3**

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on Herbs from the Drain Damp, Transform Phlegm and Stop Cough, Aromatic Herbs that Transform Damp, Food Stagnation categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Prerequisites: satisfactory progress in first year curriculum from MSTCM program. prerequisites: ACH 512

*2 lecture credits, 36 hours*

*Offered: Spring semester*

ACH 524

### **Chinese Formulae and Constituents 4**

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on Herbs from the Tonify (Yang and Yin), Stabilize and Bind, Calm Shen, Aromatic Substances to Open Orifices, Extinguish Wind and Stop Tremors, Expel Parasites, External

## Acupuncture

Applications categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Prerequisites: ACH 512

*2 lecture credits, 36 hours*

*Offered: Spring semester*

ACH 635

### CH Formulae 1

This course will be a continuation and amplification of the previous herbal curriculum (ACH 511, ACH 512, ACH 523, ACH 524) with an emphasis on herbal formulae. The student will explore at least 30 formulae including reiterating and expanding content from previous courses. This course will focus on formulae that Release the Exterior, Clear Heat, and Drain Downward. The student will learn the name, actions, indications, cautions and contraindications of the classical base formulae according to the traditional categorization based on treatment principles. In addition the student will explore the traditional structure of herbal formulae as a prelude to formula modification (general, assistant, etc.). In addition the student will review and reiterate content from the Formulas and their constituents courses. Prerequisites: ACH 511, ACH 512, ACH 523

*2 lecture credits, 36 hours*

*Offered: Summer semester*

ACH 636

### Chinese Formulae 2

This course will be a continuation and amplification of the previous herbal curriculum (ACH 511, ACH 512, ACH 523, ACH 524) with an emphasis on herbal formulae. The student will explore at least 30 formulae including reiterating and expanding content from previous courses. This course will focus on formulae that Harmonize, Dispel Summerheat, Warm Interior Cold, Release Exterior-Interior Excess, and Tonify. The student will learn the name, actions, indications, cautions and contraindications of the classical base formulae according to the traditional categorization based on treatment principles. In addition the student will explore the traditional structure of herbal formulae as a prelude to formula modification (general, assistant, etc.). Prerequisites: ACH 511, ACH 512, ACH 523, ACH 524

*2 lecture credits, 36 hours*

*Offered: Summer semester*

ACH 617

### Chinese Formulae 3

Course Description: This course will be a continuation and amplification of the previous herbal curriculum with an emphasis on herbal

formulae. The student will explore at least 80 formulae including reiterating and expanding content from previous courses. This course will focus on formulae that Stabilize and Bind, Calm the Spirit, Open the Sensory Orifices, Regulate Qi, Regulate Blood, Expel Wind, Treat Dryness, Expel Dampness, Dispel Phlegm, Reduce Food Stagnation, Expel Parasites, Treat Abscesses and Sores, and for External Application. The student will learn the name, actions, indications, cautions and contraindications of the classical base formulae according to the traditional categorization based on treatment principles. In addition the student will explore the traditional structure of herbal formulae as a prelude to formula modification (general, assistant, etc.) In addition the student will review and reiterate content from the Formulas and their constituents courses. Prerequisites: ACH 635

*2 lecture credits, 36 hours*

*Offered: Fall semester*

ACH 628

### CH Internal Medicine & Modifications 2

This course will serve as a companion course to ACH 619. This course will be a continuation and amplification of the previous herbal curriculum with an emphasis on internal medicine applications of herbal formulae. The student will reexamine previously studied herbs and formulae from previous courses with special attention to clinical application and formula modification according to clinical presentation. Prerequisites: ACH 619, 2 lecture credits, 36 hours. Prerequisites: ACH 617

*2 lecture credits, 36 hours*

*Offered: Spring semester*

ACH 619

### CH Internal Medicine & Modifications 1

This course will be a continuation and amplification of the previous herbal curriculum with an emphasis on internal medicine applications of herbal formulae. The student will reexamine previously studied herbs and formulae from previous courses with special attention to clinical application and formula modification according to clinical presentation. Prerequisites: ACH 636

*2 lecture credits, 36 hours*

*Offered: Fall semester*

ACH 641

### CH Special Topics

This course will explore special topics in TCM herbal medicine. These will include but not be limited to dui yao (herb combinations and modules), external applications, pediatrics, classical formulae from seminal texts. Content will also reflect the availability of special guest

lecturers. Prerequisites: ACH 619

*2 lecture credits, 36 hours*

*Offered: Spring semester*

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## ACC: Clinical Education

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ACC 611

### Chinese Herbal Clinic 1

Under the supervision of licensed faculty members, the interns start by observing patients for 20 clinic hours, then move into the area of direct patient care. All patient diagnoses and management plans are reviewed and approved by a clinic faculty member prior to the initiation of patient care. The student will begin to prescribe individual herbs and formulae for patient care. The student will acquire proficiency in TCM diagnostic techniques, as well as in understanding when specific herbs or formulae may not be prescribed based upon possible herb-drug interactions. Prerequisite: 0 lecture hours, 4 lab credits, 130 clock hours total.

*Offered: Fall, spring and summer semesters*

ACC 632

### Chinese Herbal Clinic 2A

Students continue to administer Chinese herbal care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the course is successful completion of the previous clinical rotation. Prerequisite: ACC 611 Chinese Herbal Clinic 1.

*0 lecture hours, 2 lab credits, 65 clock hours total.*

*Offered: Fall, spring and summer semesters*

ACC 723

### Chinese Herbal Clinic 2B

Students continue to administer Chinese herbal care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. In addition to utilizing prepared formulae, student interns now begin to mix herbal powders in individualized formulae. Eligibility for the course is successful completion of the previous clinical rotation. Prerequisite: ACC 611 Chinese Herbal Clinic 1. Pre/Co-Requisite ACC 632 Chinese Herbal Clinic 2A.

*0 lecture hours, 2 lab credits, 65 clock hours total.*

*Offered: Fall, spring and summer semesters*

# Acupuncture

ACC 724

## Chinese Herbal Clinic 3

Students continue to administer care to patients under the supervision of licensed faculty. Students will integrate herbal therapies with dietary advice and qi enhancement techniques. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the course is successful completion of the previous clinical rotation. Prerequisite: ACC 723 Chinese Herbal Clinic 2B.

*0 lecture hours, 3 lab credits, 100 clock hours total*

*Offered: Fall, spring and summer semesters*

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## Clinical Services (ACS)

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ACS 711

### Preceptorship I

The students observe and administer care in established acupuncture facilities under the supervision of licensed physicians and acupuncturists. This exposure to a variety of clinical settings helps prepare the student for both private practice and integrative patient care. Prerequisite: ABS 511.

*0 lecture hours, 4 laboratory hours, 2 semester credits, 75 clock hours total.*

*Offered: Fall, spring and summer semesters*

ACS 722

### Preceptorship II

This is a continuation of ACS 711. Students increase their clinical skills working under a variety of health care professionals, all of whom must have the appropriate credentials to practice in the field of acupuncture. Prerequisite: ACS 671.

*0 lecture hours, 4 laboratory hours, 2 semester credits, 75 clock hours total.*

*Offered: Fall, spring and summer semesters*

ACS 631

### Clinical Education 1

Under the supervision of licensed faculty members, the interns start by observing patients for 30 clinic hours, then move into the area of direct patient care. All patient diagnoses and management plans are reviewed and approved by a clinic faculty member prior to the initiation of patient care. The student will begin to practice clean needle technique, removal and disposal of needles. The student will acquire proficiency in tongue and pulse diagnosis. Prerequisite: Pass Clinical Entrance Exam.

*0 lecture hours, 12 laboratory hours, 8*

*semester credits, 245 clock hours total.*

*Offered: Fall, spring and summer semesters*

ACS 712

### Clinical Education 2

Students continue to administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the course is successful completion of the previous clinical course. Prerequisite: ACS 631 Clinical Education 1.

*0 lecture hours, 12 laboratory hours, 8 semester credits, 215 clock hours total.*

*Offered: Fall, spring and summer semesters*

ACS 723

### Clinical Education 3

Students continue to administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the course is successful completion of the previous clinical course. Prerequisite: ACS 712 Clinical Education 2.

*0 lecture hours, 12 laboratory hours, 8 semester credits, 220 clock hours total.*

*Offered: Fall, spring and summer semesters*

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## Integrated Clinical Practice (AIC)

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AIC 731

### Clinical Procedures 1

This course explores the clinical applications of the skills and knowledge learned to date for patient care in the UB Clinics. In addition, UB Clinics skills including using the electronic health system for charting, and communication with patients and other health providers in the UB Clinics is reviewed. Prerequisites: ACS 623 Clinical Dx 1, ATD 72 Case Studies 1, AWB 621 Medical Ethics.

*2 lecture credits, 0 lab credits, 2 credits total*

AIC 714

### Clinical Procedures 2

This course explores the clinical applications of the skills and knowledge learned to date for patient care in multi-disciplinary care clinics and hospital settings. Prerequisites: ACS 731 Clinical Procedures 1, AIC 631 Clinic 1.

*2 lecture credits, 0 lab credits, 2 credits total*

AIC 715

## Physical and Functional Assessments of the UB Health Sciences

This course is designed to teach the student general principles and practices of health care from the breadth of providers trained at the University of Bridgeport. The naturopathic, chiropractic, nutrition, dental hygiene and physician assistant history and scope of practice will be discussed. Practical applications of these disciplines in the area of physical and functional assessment of patients will be emphasized. Prerequisites: Clinical Dx 2, Lab Dx 1.

AIC 811

### Grand Rounds 1

This course is designed to train the AOM student to communicate effectively, orally and in writing, with patients and their families, colleagues, and others with whom health-professionals must exchange information in carrying out their responsibilities in patient care. Prerequisites: ACS 714 Clinic Entry 2; ATD 715 TCM Internal Medicine; ACC 611 Chinese Herb Clinic 1. Co-requisite: AIC 812 Integrated Clinical Education 1.

*2 lecture credits, 0 lab credits, 2 credits total*

AIC 823

### Grand Rounds 2

This course is designed to train the advanced AOM student to communicate with other health care providers to determine an appropriate plan of care. This includes the ability to assess written diagnostic reports, including the range of values that distinguish normal from abnormal findings, as relevant to patient care and communication with other health care providers. Upon completion, the student will be able to discuss the clinical scope of AOM in an informed, authoritative, and appropriate manner. Prerequisites: AIC 811 Grand Rounds 1; Co-requisite: AIC 814 Integrated Clinical Education 2.

*2 lecture credits, 0 lab credits, 2 credits total.*

AIC 812

### Integrated Clinical Education 1

Rotations in the Integrative clinic shifts combine AOM supervisors for AOM diagnosis and treatment with biomedical practitioners and other clinicians offering medical care in a variety of health settings. Students administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Prerequisites: ACS 712 Clinical Education 2;

## Acupuncture • Biology

ACC 632 Chinese Herbal Clinic 2A  
215 hours; 150 patient visits; at least 90 hours  
in off-site clinics

AIC 814

### Integrated Clinical Education 2

This is a continuation of the integrative clinical training started in ACS 812. Rotations in the Integrative clinic shifts combine AOM supervisors for AOM diagnosis and treatment with biomedical practitioners and other clinicians offering medical care in a variety of health settings. Students continue to administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Prerequisites: ACS 712 Clinical Education 2; ACC 632 Chinese Herbal Clinic 2A. AIC 812 Integrated Clinical Education 1.

215 hours; 150 patient visits; at least 90 hours  
in off-site clinics

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## Biology

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BIOLOGY 400

### Advanced Biochemistry

This course will cover the principles of biological chemistry, describe the structure, synthesis, degradation and properties of amino acids and proteins. The principles of enzymology and proteomics, lipid synthesis, degradation, function and lipidomics, mechanisms of carbohydrate metabolism including: glycolysis, gluconeogenesis, tricarboxylic acid cycle, the electron transport chain, photosynthesis, pentose phosphate pathway, and glycogen metabolism, will be covered. The techniques used to identify, characterize, and isolate biological molecules will be discussed. Prerequisite: Biology 345 or equivalent.

3 semester hours

BIOLOGY 402

### Evolution

Genotype to phenotype mapping, population genetics, molecular evolution, detection of selection, association mapping, human evolution. Prerequisite: Biology 101 and Biology 102.

3 semester hours

BIOLOGY 403

### Histology

Detailed analysis of the microscopic structure of animal cells and tissues. Laboratory work limited to study of prepared microscopic material. Prerequisite: Biology 211.

3 class periods; 1 three-hour laboratory  
periods; 3 semester hours

BIOLOGY 404

### Tissue Culture

This course is designed to train students to the techniques used in culturing mammalian tissues and cells. Students will master the necessary skills required for maintaining and analyzing cells in culture, develop laboratory skills related to cell assays and cell staining and research applications using cell cultures. Students will be introduced to concepts of designing in vitro tissue engineering products. Prerequisite: Biology 321 or equivalent.

3 semester hours

BIOLOGY 407

### Microbial Genetics

The focus of this course is on modes of genetic transfer, plasmids and mobile genetic elements. Classical and recent molecular techniques used in prokaryotic research will be emphasized. Prerequisite: Biology 307 and Biology 320 or equivalent.

3 semester hours

BIOLOGY 418

### Environmental Health

This course is designed to explore current environmental and public health concerns and issues. Students will gain an understanding of the interaction of individual and communities with the environment, the potential impact on health of environmental agents. The sequence of major topics begins with environmental epidemiology and toxicology, policy and regulation. The course then covers specific agents of environmental diseases. Domains of environmental health are addressed. Prerequisites: Biology 101 and Biology 102.

3 class periods; field trips by arrangement, 3  
semester hours

BIOLOGY 423B

### Biostatistical Analysis

Statistical analysis with application to biological science. Includes applications of probability, classifications of data, averages, dispersion, frequency distributions, confidence intervals, tests of significance, linear regression, and correlation. Prerequisite: Mathematics 323. May be taken concurrently.

1 semester hour

BIOLOGY 421

### Advanced Cell Physiology

Structure and function of subcellular organelles. Transport; the endoplasmic reticulum, protein secretion and membrane biogenesis; the cytoskeleton; mitochondria, chloroplasts

and the generation of useful energy and other topics. Prerequisite: Biology 321 or equivalent.

3 semester hours

BIOLOGY 423

### Advanced Ecology

Students will read classic and recent ecological literature in ecology. At the completion of the course students will prepare a literature review or research proposal. Prerequisite: Biology 223 or equivalent.

3 semester hours

BIOLOGY 424

### Physiological Ecology

Students will read recent literature across a range of topics in physiological ecology. At the completion of the course students will prepare a literature review or research proposal. Prerequisite: Biology 223 and Biology 211 or equivalent.

3 semester hours

BIOLOGY 430

### Marine Ecology

Examination of the ecology of the oceans, relation of distribution to the physical and chemical environments, productivity of the marine communities and the interaction of man with marine communities. Prerequisite: Biology 223.

3 lectures, 1 three-hour lab, 4 semester hours

Lab Fee Assessed

BIOLOGY 441

### Cell Molecular Immunology

A three credit-hour lecture course that will cover the molecules, cells and organs of the immune system. Students will study the structural features of the components of the immune system and their functions. Emphasis of the course will be given on the mechanisms involved in immune system development and responsiveness. Prerequisites: Biology 211.

3 semester hours

BIOLOGY 443

### Advanced Molecular Biology

The study of genes and their activity at the molecular level, DNA replication and repair, transcription, translation, recombination, translocation, and mutations. Techniques and experiments leading to important discoveries on DNA will be covered. Prerequisites: Biology 345 or Biology 343 or equivalent

3 semester hours

BIOLOGY 444

### General Toxicology

An advanced course designed for the toxicology student interested in broadening her/his knowledge into the sciences of toxic agents

## Biology • Biomedical Engineering

(poisons) and their effect on biological systems and the environment. The relevance of chemical and biological properties of toxic agents to human health, and the biotransformation reaction of certain chemical agents will be discussed. The course will cover in detailed the toxic effects, at the molecular, cellular, organ and system level, resulting from exposure to xenobiotics. The course content will cover all aspects of toxicology: The General Toxicological Principles, Disposition of Toxic Agents, Non-organ Directed Toxicity, Target Organ Toxicity, Toxic Agents, Environmental Toxicology and Applications of Toxicology. Prerequisite: Biology 211 and Chemistry 206.

*3 semester hours*

BIOLOGY 445

### Advanced Methods in Molecular Biology

A graduate course exploring the fundamental skills required by molecular biology and biotechnology. This course will emphasize key methodologies utilized in both biotechnology industries and molecular biology research. Prerequisite: Biology 345 Biology 343 or equivalent.

*3 semester hours*

BIOLOGY 446

### Envt Toxicology

Students will broaden their knowledge of environmental toxic agents (physical, chemical, biological) and their effect on biological systems and the environment. The relevance of chemical and biological properties of toxic agents to human health, and the biotransformation reaction of certain chemical agents will be discussed. The course will cover in detailed the physical-chemical properties and their toxic effects, at the molecular, cellular, organ and system level, resulting from exposure to environmental pollutants. Prerequisite: Biology 344 or equivalent.

*3 semester hours*

BIOLOGY 470

### Research Rotation

This course is given in the Spring semester and consists of sequential laboratory experiences in each of two separate research laboratories.

*1 semester hour*

*Laboratory fee: \$60 per semester*

BIOLOGY 479

### Bioinformatics

Students will design and develop algorithms for biological problems such as data mining, and analysis of nucleic acid, protein, and genomic datasets. Students will work with popular bioinformatics algorithms to understand

design methodology and identify the potential weaknesses in traditional bioinformatics algorithms. Prerequisite: Mathematics 423B and Biology 345 or equivalent.

*3 semester hours*

BIOLOGY 480

### Selected Topics

Modern courses in diverse areas of faculty specialization within the biological sciences. Prerequisites to vary with the course and instructor, permission of the instructor required.

*1-4 semester hours*

BIOLOGY 490

### Departmental Seminar

Enrollment and attendance at this seminar is required of all students. Presentations by invited speakers from University of Bridgeport, other universities, and research institutions.

*1 semester hour*

BIOLOGY 491

### The Gut Microbiome

This course covers complex host-microbial interactions that are essential for health. Disturbing the relationships triggers a wide variety of diseases such as obesity and diabetes. Factors perturbing the gut microbes include dietary changes, drugs, stress, surgical intervention and the environment. Prerequisite: Biology 320 or the equivalent.

*3 semester hours*

BIOLOGY 493

### Bioelectric Phenomena

The course will review and investigate a variety of bioelectric phenomena, including origins and operations of trans-membrane potentials in excitable cells, their propagation between and among cells, their dissemination among various conductive tissues and different body fluid compartments and their measurement within the body or at the body surface. Also considered will be the generation, conduction and propagation of electrical or electromagnetic fields within and beyond the body and the interaction of such fields with ionizing and non-ionizing radiation generated naturally as well as by present and developing technology, with emphasis on health effects of such interactions. Prerequisite: Biology 213, Biology 214, or Biology 211 or equivalent.

*3 semester hours*

BIOLOGY 498

### Internship

The student will complete internship in a research or clinical facility, with departmental approval.

*3 semester hours*

BIOLOGY 499

### Master's Research

Supervised research leading to the preparation and completion of a thesis in partial fulfillment of the master's degree requirements. Students enrolled in the thesis program must complete six credits of master's research.

*3 semester hours*

*Laboratory fee: \$60 per semester*

BIOLOGY 500

### Maintaining Matriculation

Domestic students not registered for other courses must register for Biology 500 until the completion of the degree requirements.

*No credit*

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## Biomedical Engineering

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BIOMEDICAL ENGINEERING 410 (BMEG 410/ELEG 410)

### Biosensors

This course will provide an overview of biosensors, including their use in pharmaceutical research, diagnostic testing, and policing the environment. Topics include the fabrication, characterization, testing, and simulation. The transducer phenomenology, biosensor structure, and sensor performance will also be covered.

*3 semester credits*

BIOMEDICAL ENGINEERING 412 (BMEG 412/ELEG 412)

### Bioelectronics

Discipline of biomedical Engineering has emerged due to integration of engineering principles and technology into medicine. This course is intended for engineers and engineering students interested in pursuing career in biomedical engineering and health related field. This course will first introduction Applications of electrical engineering principles to biology, medicine, behavior, or health will be identified during first half of the semester. Second half of the course will focus on research, design, development and application of biosensors and Bioelectronics.

*3 semester credits*

BIOMEDICAL ENGINEERING 413

### Bioinformatics

Biology has become target of more algorithms than any other fundamental science. This course is about designing and developing algorithms for biological problems. Students will work with popular bioinformatics algorithms not only to understand algorithms design mythologies but also to identify strengths and potential weaknesses in traditional bioinformatics algorithms.

# Biomedical Engineering

3 SEMESTER CREDITS BIOMEDICAL ENGINEERING 443  
(BMEG 443/ELEG 443)

## Digital Signal Processing

This is an introductory course in Digital Signal Processing (DSP) for graduate Electrical and Computer Engineering students. Sometime will be spent initially reviewing major concepts in signals and systems. Major topics to be covered in ELEG 443 include: time-domain analysis of discrete-time (DT) systems (convolution, difference equations), the transform, frequency analysis for DT signals and systems (DTFT, DFT, FFT), digital filter design, and selected advanced topics as time permits.

*3 semester credits*

BIOMEDICAL ENGINEERING 448

## Microfabrication

This class covers basic microfabrication processes for semiconductor and VLSI fabrication, including photolithography, plasma and reactive ion etching, ion implantation, diffusion, oxidation, evaporation, vaporphase epitaxial growth, sputtering, and CVD. Advanced processing topics such as next generation lithography, MBE and metal organic CVD are also introduced. The physics and chemistry of each process are introduced along with descriptions of the equipment used for the manufacture of integrated circuits. The integration of microfabrication process into CMOS, bipolar, and MEMS technologies are also discussed. The purpose of this course is to provide students with technical background and knowledge in silicon microelectronic fabrication process. Upon finishing this course, students will be familiar with the basic semiconductor and VLSI microfabrication processes.

*3 semester credits*

BIOMEDICAL ENGINEERING 451

## Introduction to Nanotechnology

Nanotechnology is the science and engineering involved in the design, synthesis, characterization and application of materials and devices with the size in nanometer (10<sup>-9</sup>m) scale. As a newly emerged exciting high-technology, it has attracted intensive interest and heavy investments around the world. Nanotechnology is a general-purpose technology which will have significant impact on almost all industries and all areas of society. It can offer better built, longer lasting, cleanser, safer and smarter products for home, communications, medicine, transportation, agriculture and many other fields. This course will cover basic concepts in nanoscience and nanotechnology.

*3 semester credits*

BIOMEDICAL ENGINEERING 453

## Pattern Recognition

Operation and Design of systems that recognize patterns in data, based primarily on statistical and neural network approaches. Topics include Bayesian decision theory, Electrical Engineering Parametric likelihood estimation, Nonparametric techniques, Linear discriminant functions and Neural Networks.

*3 semester credits*

BIOMEDICAL ENGINEERING 454

## Speech Signal Processing

To introduce the fundamentals of speech processing and related applications. Course covers speech enhancement, speech coding, and speech recognition.

*3 semester credits*

BIOMEDICAL ENGINEERING 459

## Audio Processing Lab

Introduction to TMS320C55x Digital signal Processor, Audio Signal Processing, Basic Principles of Audio Coding, Speech Enhancement Techniques, Quantization of Audio signals, Calculating LPC coefficient using C55x Intrinsic, Matlab Implementations of noise Reduction (NR), Mixed C55x Assembly and Intrinsic Implementations of Voice Activity Detection (VAD), Combining AEC with NR, Voice over Internet Protocol Applications, Overview of CELP Vocoders.

*3 semester credits*

BIOMEDICAL ENGINEERING 460

## Introduction to Robotics

Introduction to the kinematics, dynamics, and control of robot manipulators and to applications of artificial intelligence and computer vision in robotics.

*3 semester credits*

BIOMEDICAL ENGINEERING 464

## PC Lab

This course will start with the basics of Boolean Algebra; it will cite the differences between PLC control and relay control and full automation of major machines and appliances; the differences in these controls will show how hard relay control is to implement and how flexible PLC control actually is; many different math functions will be analyzed and implemented in the theoretical construction of fully functioning PLC.

*3 semester credits*

BIOMEDICAL ENGINEERING 466

## Found DNA and Biotechnology

The Focus of the course shifts towards the scientific foundation of genetic data and the human genome and investigates contempo-

rary issues.

*1-3 semester hours*

BIOMEDICAL ENGINEERING 467

## Introduction to Mechatronics

Introduction to Mechatronics, Definition of Mechatronics, Mechatronics in factory, office and home automation. Overview of Microprocessors, Micro controllers and microcomputer systems, Hardware and software, Assembly level and higher level programming.

*3 semester hours*

BIOMEDICAL ENGINEERING 470

## Advanced Robotics

Advanced robotics and automation topics and techniques, including: active robotic sensing, intelligent and integrated manufacturing systems, robotic inspection, observation under uncertainty, multisensor feedback control of manipulators and mobile robots, advanced simulation and monitoring of robotic systems, high level modeling and control, and other topics.

*3 semester hours*

BIOMEDICAL ENGINEERING 500

## Graduate Co-op/Internship in Biomedical Engineering

Students will work for a company in a role that is appropriate for an MS-BMEG graduate, or near graduation. Through this experience students will apply biomedical engineering principles and theory in a practical setting. The student will write a paper summarizing the tasks and accomplishments encountered within the organization, as well as make engineering recommendations for improvement of the biomedical engineering process in the company, or division in which s/he was employed. By Arrangement.

*1-3 semester hours*

BIOMEDICAL ENGINEERING 508 (BMEG 508/MEEG 508)

## Biomechanics

Biomechanics is the application of mechanical principles to living organisms that included bioengineering, research and analysis of mechanism in living organisms, and application of engineering principles to and from biological systems. This course can be carried forth on from the molecular level including collagen and elastin, all the way up to the tissue and organ level. Some simple applications of Newtonian mechanics can supply approximations on each level, but precise details demand the use of continuum mechanics.

*3 semester credits*

# Biomedical Engineering

BIOMEDICAL ENGINEERING 510 (BMEG 510/ELEG 510)

## Medical Machines

This course, provides very good introduction and understanding of Electrical Safety, Medical electronics and Medical Machines as applicable. Students often have different background and level of understanding of technical concepts; therefore we will develop necessary background in this course in first few weeks and gradually move from basic to advance topics as listed below in "Class Topics" section. This course will further help by developing approach to design devices and safety features. Behind every invention, law or device, there is always a need, a necessity. Students go from necessity to invention in the class. Since large number of electronic equipments are being used in hospitals and medical centers for patient care and diagnosis or carry out advanced surgeries. This course will enable students to learn the basics principles of different instruments used in medical science.

*3 semester credits*

BIOMEDICAL ENGINEERING 512 (BMEG 512/MEEG 512)

## Computational Fluid Dynamics (CFD)

Computational fluid dynamics (CFD) is employed in a wide range of industries and disciplines, such as aerospace engineering, automotive engineering, biomedical science and engineering, chemical engineering, civil engineering, power engineering and sports engineering. Practicing engineers are constantly facing extreme challenges to solve complex fluid flow and heat transfer problems using commercial CFD software. To avoid flawed CFD simulation and results interpretation using commercial CFD packages by users with inadequate training, understanding the fundamental principles that underlie commercial CFD solvers can help the users to effectively harness the power of modern CFD for their research or design. This course is intended as an introduction to the scientific principles and practical engineering applications of CFD. It combines lectures on the CFD principles with projects of research or industrial applications. The emphasis of this course is not to teach the theory behind the CFD techniques, but to help the students apply the knowledge gained into practical use of commercial CFD software (COMSOL, ANSYS and/or STAR-CCM+). Students will first learn the complete CFD process from modeling and approximation, mesh design, computation, to results interpretation through lectures and case studies. The necessary theoretical background in fluid mechanics and heat transfer will be covered in these case

studies. Tutorials will be provided to show how to set up, run and interpret the results of CFD models in a commercial code, COMSOL. Students will then work in a project team to solve selected research or industrial fluid flow and/or heat transfer problems in their own field (such as mechanical systems, electronics systems, or biomedical systems) using CFD.

*3 semester credits*

BIOMEDICAL ENGINEERING 513 (BMEG 513/ELEG 513)

## Biomedical Image Processing

This course is an elective course. The content of this course include the fundamentals of Digital Image Processing and its applications in biomedical field. Sampling and Quantization of signals are mentioned in order to introduce the digital images, some basic relationship between pixels are mentioned. Introduction to Fourier Transformation, Discrete Fourier Transform and Fast Fourier Transformed are explained. MATLAB programming with Image Processing Toolbox will be introduced to empathize and rigid the understanding of students. Others important fundamental theorems, e.g., Image Enhancement, Image Segmentation, Representation and Description are also mentioned. Students are required to implement some programs using the theorems learnt in classes.

*3 semester credits*

BIOMEDICAL ENGINEERING 515

## Advanced Digital Systems

The objective of this graduate level course is to introduce the modern design methodologies for digital logic and automatic synthesis of digital systems. Students are provided with access to the CAD tools to use hardware description language to model, analyze and design various digital circuits/systems. It is expected that students will acquire a clear understanding of the main techniques, design strategies and the optimizations that are involved in modern digital circuit modeling, design and synthesis. The course projects will include the design and optimization of advanced critical digital systems used in bio-related applications.

*3 semester credits*

BIOMEDICAL ENGINEERING 517

## NMR in Biomedical engineering

A noninvasive imaging method that provides information about cellular activity (metabolic information). It is used in oncology along with magnetic resonance imaging (MRI) which provides information about the shape and size of the tumor (spacial information). Also called 1H-nuclear magnetic resonance spectroscopic

imaging and proton magnetic resonance spectroscopic imaging.

*3 semester credits*

BIOMEDICAL ENGINEERING 532

## Melanogenesis/Melanomagenesis: Implications

*3 semester credits*

BIOMEDICAL ENGINEERING 535 (BMEG 535/TCMG 535)

## Foundations of Biotech Sciences and Management

This course defines biotechnology as the application of molecular biology for useful purposes. It simulates the real world science and business environments: Information and knowledge are complex, highly specific, fragmented, diverse and vast. No one individual or group or business entity or government agency is able to cover in-depth the entire science and business continuum to succeed and create value to society at large. Value creation has three different aspects: data, information and knowledge assimilation, degree of collaboration and methodology to establish successful knowledge management and business processes. The continuum of the biotechnology industry is shaped by scientific, legal, regulatory, social, economic, technological, political, financial and commercial factors. Understanding the dynamics and linked contributions of the interdisciplinary array of factors which affect commercialization of bioscience discoveries is essential to operate in the biotechnology industry. In this course we are dissecting the biotechnology industry to isolate the key drivers and study their interactions.

*3 semester credits*

BIOMEDICAL ENGINEERING 543

## Advanced DSP

(1)review briefly the concepts of DSP (E443), including digital filter design and windowing (2) Carry on with new topics in Adaptive Filters, Wiener Filters, Kalman filters, power spectrum and related topics, statistical signal processing, and stochastic processes.

*3 semester credits*

BIOMEDICAL ENGINEERING 543

## DSP Lab

This is an introductory course in Digital Signal Processing (DSP) for graduate Electrical and Computer Engineering students. Sometime will be spent initially reviewing major concepts in signals and systems. Major topics to be covered in ELEG 443 include: time-domain analysis of discrete-time (DT) systems (convolution, difference equations), the transform, frequency analysis for DT signals and systems (DTFT, DFT, FFT), digital filter design, and

## Biomedical Engineering

selected advanced topics as time permits.

*3 semester credits*

BIOMEDICAL ENGINEERING 546 (BMEG 546/ELEG 546)

### **Biosignal Processing**

This is an introductory course in Bio-Signal Processing (DSP) for graduate Electrical and Computer Engineering students. Sometime will be spent initially reviewing major concepts in signals and systems. Major topics to be covered in ELEG 546 include: Concepts of signal and image processing, wavelets, classification and clustering, and applications of these concepts to EEG, ECG, EMG, MRI and CT Scans.

*3 semester credits*

BIOMEDICAL ENGINEERING 547

### **Bio MEMS**

BioMEMS is the application of MEMS (Micro-electromechanical Systems) technology in the fields of biomedical and health sciences. Due to their small size, BioMEMS have the advantages of low weight, low cost, quick response, high throughput, high efficiency, requiring much less sample, reagent and easy integration. BioMEMS found broad applications in disease diagnosis, prevention and treatment. Various BioMEMS products have been developed, such as microfluidic devices, neural interface devices, uTAS, lab-on-a-chip, DNA chips, micro drug delivery system, microsurgical tools, bio-sensors. This course introduces to students the fundamentals of BioMEMS technology, typical bioMEMS devices and their applications.

*3 semester credits*

BIOMEDICAL ENGINEERING 555

### **Biotechnology & Entrepreneurship**

This course covers theory and practice of bi-entrepreneurship. It explores the transformative and disruptive nature of scientific discoveries and the innovative and entrepreneurial process for turning knowledge into profitable business. Students are required to develop and communicate in-depth knowledge on the evolution of the biotechnology industry and the behavior of entrepreneurial biotechnology firms to build core competencies and acquire funding. Individual and team projects and case studies are integrated into the course.

*3 semester hours*

BIOMEDICAL ENGINEERING 561 (BMEG 561/ELEG 561)

### **Instrumental Analysis of Nanomaterials**

The course will give an overview on several important analytical tools for nano materials characterization. Mechanical, electrical and electronic and biological property testing of the nano materials such as carbon nanotubes,

metal nanoparticles, quantum dots, nanowires conformable nanoelectronics materials, polymer nanoparticles and biomedical nanomaterials will be discussed. Process and product evaluation by physical, chemical and microscopic methods for materials in nano-regime will be highlighted. Modern materials science depends on the use of a battery of analytical methods carried normally in specialized laboratories. This course explains the fundamental principles associated with the various methods and familiarize the students with them, their range of applicability and reliability especially when materials are of nanoscopic dimension.

*3 semester credits*

BIOMEDICAL ENGINEERING 562 (BMEG 562/ELEG 562)

### **Nanofabrication with Soft Materials**

This is an advanced level graduate course focusing on fabrication of soft materials. Nanofabrication processes and nanosystem products will be discussed. Fundamentals associated with chips fabrications and linking them toward soft materials assembly will be detailed. Emerging nanotechnology based methods for soft and green electronics, mechanical parts, MEMS, PCBS will be covered. Gene chip, label free sensory assay using micro and nanofluidics will be discussed. Transfer printing, DNA-protein interactions using the chip and several nano-scale assemblies for soft materials fabrication will be discussed.

*3 semester credits*

BIOMEDICAL ENGINEERING 563

### **Polymer Nanocomposites**

This is a graduate level course that emphasizes on the structure property and functions of nanocomposites based on polymers and other biomaterials toward biomedical, mechanical and electrical property driven device applications.

Various examples of smart materials, their fabrications, and the use in understanding biophysical and biochemical processes are discussed.

*3 semester hours*

BIOMEDICAL ENGINEERING 565 (BMEG 565/ELEG 565)

### **Biomedical Materials and Engineering**

This course introduces the students with the progress of biomaterials used in biomedical engineering. Starting from early civilizations biomaterials this course discusses modern advanced level biomaterials and their engineering principles associated with their biomedical use. Hip, knee Prostheses, implants, grafts, sutures, stents, catheters materials and their application in Biomedical Engineering are covered. Designed biomaterials such as silicones,

polyurethane, Teflon, hydrogels, bionanocomposites are detailed. Modern Biology and biomedical engineering such as protein absorption, biospecific medical materials, nonfouling materials, healing and foreign body reaction, controlled release etc are discussed. Surface-immobilized biomolecules in patterned surfaces are explained with specific examples of the use of immobilized biomolecules, immobilized cell ligands, and immobilization methods. Recent advances in biomedical engineering from the perspectives of inkjet printing of cells and tissues for 3D-medical textiles, nanofibers and films in biomedical engineering by electrostatic spinning, bio-inspired materials through layer by layer (LBL) assembly and biogels and advanced instrumentations in biomedical engineering are updated. Artificial red blood and skin substitutes, orthopedic biomaterials applications adhesives and sealants, diagnostics, biomedical sensors, extracorporeal artificial organs and ethical issues of biomedical engineering are discussed.

*3 semester credits*

BIOMEDICAL ENGINEERING 567

### **Physiological Fluid Mechanics**

There is a great and vital difference between the transport processes in the human body from other engineering systems. A thorough understanding of physiological fluid mechanics is essential for innovation in biomedical technology. Emphasis in the course is placed on flow and thermal mechanics of biofluids, measurement methods, modeling for engineering application, and understanding application to biomedical problems including assist and monitoring devices.

*3 semester hours*

BIOMEDICAL ENGINEERING 573

### **Magneto Bio-Engineering**

Magneto Bioengineering is a fast-developing field of research, its practical and environmental aspects being a topic of ever-increasing number of applications encompassing the field of biomedical engineering including but not limited to MRI (magnetic Resonance Imaging), magnetic therapy, neural stimulation, magnetic field treatment for nonunion (fractures that fail to heal) and so on. At the same time, physically, the biological effects of weak magnetic fields or Extremely Low Frequency (ELF) magnetic fields are still regarded as a paradox. This course deals with such issues and fills in the theoretical gap in biomedical engineering. It reviews and analyzes the experimental evidence that yields useful insights into the primary physical processes of magneto-reception

## Biomedical Engineering • Business Capstone • Business Communications • Business Law

and the frequency and amplitude spectra of the action of weak magnetic fields in living system and hence the course addresses important issues in biomedical engineering. Also, the course reviews the available hypothetical mechanisms for that action as applicable to the field of biomedical engineering. Besides this the presence of magnetic crystals in certain species of prokaryotes as well as in birds (for migration) and in humans is still under active investigation and is also covered in this course as a possible way of exploiting such information for application in biomedical engineering.

BIOMEDICAL ENGINEERING 580

### Tissue Engineering

The objective of this course is to provide students a foundation for the understanding of cell based systems needed for tissue engineering. The structure-property-function relationships in normal and pathological mammalian tissues will be covered. A review of the current development of biological substitutes to restore, maintain, or improve functions that includes strategies to regenerate metabolic organs and repair structural tissues, as well as cell-based therapies to deliver proteins and other therapeutic drugs will be discussed. There are a variety of very important materials issues in tissue engineering, which will be discussed in detail. Cells adherence to the extracellular matrix materials in the body and their enormous effect on cell behavior will be detailed. The physical and chemical properties of these materials will be examined and important materials used in tissue engineering will be discussed.

3 semester credits

BIOMEDICAL ENGINEERING 587

### Embedded Systems Design

Design of systems having major hardware and software components. Software implementations are used to control specific hardware such as micro controllers. Major laboratory emphasis to realize embedded systems.

3 semester credits

PROJECT/THESIS EXTENSION (BMEG 596)

### Extension of the continued research thesis work

(Lecture hours and topics to be arranged with instructor).

1 semester hour

BIOMEDICAL ENGINEERING 620A/620B

### Thesis I

This course must be taken in your last semester of course work or later. This is a team based project. Teams with members from both the life sciences and the quantitative sciences

are strongly encouraged. You may have more than one advisor, but one faculty member needs to be identified as the primary advisor. Your capstone project may be based on a single project or multiple projects. Each project, however, must be experimental or simulation in nature and be interdisciplinary. The project results should be publishable in peer reviewed journals. All projects must be approved by the University's BME program committee prior to student enrollment in the BME 620 course.

BIOMEDICAL ENGINEERING 620B

### Thesis II

This course must be taken in your last semester of course work or later. This is a team based project. Teams with members from both the life sciences and the quantitative sciences are strongly encouraged. You may have more than one advisor, but one faculty member needs to be identified as the primary advisor. Your capstone project may be based on a single project or multiple projects. Each project, however, must be experimental or simulation in nature and be interdisciplinary. The project results should be publishable in peer reviewed journals. All projects must be approved by the University's BME program committee prior to student enrollment in the BME 620 course. Prerequisite: BEMG 620A.

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## Business Capstone

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BUSINESS CAPSTONE 597

### Integration and Application: Strategy

This is a capstone course dealing with the development and implementation of business strategy and planning within a framework of ethical decision-making, globalization and managing accelerating change. The student is tested on his/her capability to apply all prior learning to solve actual strategic management problems. The final project of this course is project-based, and shall constitute an outcome assessment of what the student has learned in the MBA program. This project, normally an extensive and comprehensive case study, will be graded by several faculty members representing different and relevant disciplines. Prerequisites: Completion of all core and required courses and completion of all Major courses or concurrent registration with final Major courses. Normally, students enroll toward the end of their MBA program.

3 semester credits

BUSINESS CAPSTONE 595

### Independent Study

This course is reserved for a special project

that cannot be done in any other course format and is intended to allow a student complete his/her MBA requirements. Students will study a topic approved by their professor and present a substantial written report regarding the topic. Prerequisite: Completion of core courses and required Major courses. Written approval to register by the supervising professor and the Assistant Dean are required. This course is normally taken towards the end of the student's MBA program.

3 semester credits

BUSINESS CAPSTONE 598

### Integration and Application: Thesis

Students will complete a report based on field, library and institutional research to demonstrate ability to conduct investigations in a managerial discipline. The topic of the report may concern any business issue, industry or organization and may be related to the student's current or future employment. Prerequisites: Completion of all Major courses or concurrent registration with final Major courses. This course should be taken in the final semester of a student's MBA program and approval of the student's faculty advisor is required.

3 semester credits

BUSINESS CAPSTONE 599

### Integration and Application: Internship

*This course should be taken towards the end of the student's program of study and requires the approval of the student's faculty advisor.*

3 semester credits, 1 semester credit, 1 semester credit

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## Business Communications

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BUSINESS COMMUNICATIONS 400

### Business Written Communications

The purpose of this course is to improve the ability of students to effectively communicate with a variety of writing techniques. Students will not only learn and practice grammatical principles, but also learn to present tables and graphs, and to organize and coherently structure their written reports. Prerequisites: Admission to graduate study.

3 semester credits

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## Business Law

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BUSINESS LAW 400

### Legal Environment of Business and Ethics

Students course focuses on how the legal environment of business impacts business decisions with broad ethical, international, and

## Business Law • Chiropractic

critical thinking examples throughout. Knowledge of the legal aspects of running a business will enable the student to conduct business within the legal framework and understand the ethical dimension of business decisions. Topics include: Introduction to Business Ethics and the Judicial and Legislative Process; Litigation, Alternative Dispute Resolution, and the Administrative Process; Business Crimes, Torts, and Contracts; the Constitution and Government Regulation of Business; Business Organizations; Employment and Labor Laws; Consumer Protection and Environmental Regulation; and International Law and Ethical Conflicts. Prerequisites: Admission to graduate study.

*3 semester credits*

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### Chiropractic

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#### Anatomy

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AN511

##### **Cell and Tissue Microscopic Anatomy and Physiology**

This course will focus on the study of the microscopic anatomy and physiology of cells and basic tissue type. A major emphasis will be placed on connective, neural and muscular tissue. A working knowledge of the microscopic structure and function of the basic tissue types will provide a framework for understanding how the organization of the tissue contributes to organ and organ system physiology.

*3 lecture hours, 3 semester hours*

AN512

##### **Functional Anatomy and Biomechanics I: Spine**

This course addresses the functional anatomy and biomechanics of the spinal column, ribs and pelvis. Emphasis is placed on the interrelationships between the structure and function of the spinal column and its surrounding anatomical structures. Biomechanical principles are incorporated into functional anatomy of a dynamic human musculoskeletal system. Instruction includes lecture, dissection, tutorials, prosection and models.

*3 lecture hours, 3 laboratory hours, 4.5 semester hours*

AN513

##### **General Anatomy I: Viscera**

This course focuses on the anatomy of the organs plus the structure of the muscles, bones and additional tissues of the walls of the human thoracic and abdominopelvic cavities. The neurological, vascular and positional

relationships of these organs are discussed with emphasis on the clinical applications. Instruction includes lectures and laboratory with dissection and prosection, osseous structures and models.

*3 lecture hours, 3 laboratory hours, 4.5 semester hours*

AN514

##### **Clinical Embryology**

Embryology covers the fertilization and structural development from the zygote to birth. This course correlates the embryological development with other courses offered in Semester I and II. Normal development, clinical correlations and common congenital abnormalities are presented. Emphasis is placed on the skeletal, muscular and nervous systems.

*1 lecture hour, 1 semester hour*

AN525

##### **General Anatomy II: Head and Neck**

This course focuses on the anatomy of the head, including the gross anatomy of the brain and special sense organs, and neck. The neurological and vascular relationships of these regions are discussed with emphasis on clinical applications. Instruction includes lectures, laboratory dissection and prosection and models. Prerequisites: AN511, AN512, AN513, AN514.

*3 lecture hours, 3 laboratory hours, 4.5 semester hours*

AN526

##### **Functional Anatomy and Biomechanics II: Extremities**

This course is a regional exploration of the appendicular system. Bones, muscle attachment and function, vasculature and innervation are discussed. Emphasis is on understanding function based on attachment and innervation. Relevant clinical problems are presented. Instruction includes lecture, full dissection of pectoral girdle, pelvic girdle, and extremities, presentation of prosections, study of bones and models. Prerequisite: AN513.

*3 lecture hours, 3 laboratory hours, 4.5 semester hours*

AN527

##### **Embryology II**

*1 lecture hour, 1 semester hour*

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### Biochemistry

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BC511

##### **Biochemistry, Metabolism and Nutrition: I**

This course covers the biochemical principles involved in maintaining functional homeostasis.

*2 lecture hours, 2 semester hours*

BC612

##### **Biochemistry, Metabolism and Nutrition: II**

This course is a continuation of BC511. Prerequisite: BC511

*2 lecture hours, 2 semester hours*

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### Business Procedures

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BP500

##### **Chiropractic Co-op Work Experience**

*1 credit hour*

BP721

##### **Documentation and Insurance Protocols (Billing and Coding)**

The successful student will be able to identify and discuss all of the important aspects of patient communication, medical documentation and insurance protocols/coding. In addition, the successful student will be able to identify and apply appropriate billing protocols regarding filing insurance claim forms.

*1 lecture hour, 1 credit hour*

BP722

##### **Business Procedures and Marketing**

This is a business procedures course that stresses the importance of ethical and legal business management procedures. The classroom discussions cover strategic management, chiropractic and health care economics, marketing and image building. Successful completion will prepare the student to enter chiropractic practice.

*1 lecture hour, 1 credit hour*

BP811

##### **Hospital Procedures, Insurance and Office Management**

*2 lecture hour, 2 credit hour*

BP812

##### **Small Business Management**

*2 lecture hour, 2 credit hour*

BP813

##### **Starting a Chiropractic Practice and Office Management**

At the completion of this course, the successful student will have a clear understanding and knowledge of the three basic choices when starting a chiropractic practice. They will also recognize their options related to selecting a business structure as well as being able to identify the type of practice they want to establish. In addition, the student should be able to recognize the different types of health insurance and manage care plans typically encountered in a chiropractic office as well

# Chiropractic

as the importance of obtaining access into these insurance networks. Finally, the student should recognize the importance of the report of findings, HIPAA (Federal) guidelines and basic hospital protocols.

*1 lecture hour, 1 credit hour*

## **Chiropractic Skills and Technique**

TE511

### **Chiropractic Examination Skills I: Palpation and Biomechanics of the Spine and Pelvis**

This course addresses the biomechanics and chiropractic assessment procedures of the spinal and pelvic joints. The student is introduced to the concepts of biomechanics as they relate to the kinematics and kinetics of the spine and pelvis and the structure and functioning of the tissues of the musculoskeletal system.

*2 lecture hours, 2 semester hours*

TE511L

### **Chiropractic Examination Skills I: Palpation and Biomechanics of the Spine and Pelvis - Laboratory**

This laboratory course addresses the biomechanics and chiropractic assessment procedures of the spinal and pelvic joints. Students are introduced to the concepts of biomechanics as they relate to the kinematics and kinetics of the spine and pelvis and the structure and function of the tissues of the musculoskeletal system. This information is coupled with the diagnostic tools of inspection, range of motion, static and motion palpation as they pertain to the assessment of spinal joint function. Additionally students will be trained and tested in the performance of the motor patterns necessary to deliver the chiropractic adjustment. Training will include various hand contacts, thrusts and stances as they apply to the performance of the adjustment.

*3 laboratory hours, 1.5 semester hours*

TE522

### **Chiropractic Examination Skills II: Palpation and Biomechanics of the Extremities**

Clinical biomechanics of the upper and lower extremities and TMJ are presented. The anatomy of the upper and lower extremity articulations, muscles and associated ligaments are integrated into an understanding of proper joint function and the production of movement, stability and injury.

*2 lecture hours, 2 semester hours*

TE522L

### **Chiropractic Examination Skills II: Palpation and Biomechanics of the Extremities Laboratory**

Clinical biomechanics and associated chiropractic assessment procedures of the upper and lower extremities and TMJ are presented and practiced. Previously learned spinal assessment procedures are reviewed and practiced.

Prerequisites: TE511L, Co-Requisite AN526

*3 laboratory hours, 1.5 semester hours*

TE613

### **Technique Procedures I: Introduction to Full Spine Technique Lecture**

This course will begin with a review of biomechanics and assessment procedures presented in palpation skills TE522 and TE511. Selected spinal conditions will be presented and discussed as they pertain to diagnosis, differential diagnosis and case management. Prerequisites: AN512, TE511 and TE522

*1 lecture hour, 1 semester hour*

TE613L

### **Technique Procedures I: Introduction to Full Spine Technique Laboratory**

This course introduces students to full spine adjustive procedures from the occiput to the pelvis. This course will begin with a review of biomechanics and assessment procedures presented in palpation skills AN512 and TE511. In addition, this course will concentrate on the psychomotor skills required to perform the specified spinal adjustments from occiput to the pelvis. Prerequisites: AN512, TE511L

*3 laboratory hours, 1.5 semester hours*

TE624

### **Technique Procedures II: Intermediate Full Spine and Upper Extremity Adjusting**

Principles of patient management and common clinical conditions of the head, neck, thoracic and upper extremity regions are presented. Evidence-based diagnostic and treatment protocols are stressed along with chiropractic management and proper referral and co-management. Prerequisites: TE613, DX611, DX612, TE522L, DX611L, DX612L

*2 lecture hours, 2 semester hours*

TE624L

### **Technique Procedures II: Intermediate full Spine and Upper Extremity Adjusting Laboratory**

The laboratory portion is a review and practice of new and previous techniques taught with an emphasis on skill refinement. Intermediate level spinal techniques and upper extremity techniques are presented and practiced. Prerequisite: TE613L, TE522L

*4 laboratory hours, 2 semester hours*

TE625

### **Technique Procedures III: Soft Tissue**

Students are introduced to the concepts of soft tissue diagnostic procedures and treatment procedures. These include the etiology, pathophysiology, diagnosis and treatment of soft tissue dysfunction and trauma, differential diagnosis and case management of soft tissue dysfunction and trauma, differential diagnosis and case management of soft tissue lesions are presented. Prerequisites: TE511, 511L, TE522, 522L, TE613, AN512, AN526, NS612

*2 lecture hours, 2 semester hours*

TE625L

### **Technique Procedures III: Soft Tissue Laboratory**

The laboratory portion covers the diagnosis and treatment of muscle hypertonic states. Prerequisites: TE613L, TE522L

*2 laboratory hours, 1 semester hour*

TE716

### **Technique Procedures IV: Intermediate Full Spine and Lower Extremity Technique**

Clinical biomechanics of the lumbopelvic region and lower extremities are reviewed. Evidence-based differential diagnosis and case management of lumbopelvic and lower extremity clinical conditions common to chiropractic practice are presented and discussed. Prerequisites: TE624, TE624L

*2 lecture hours, 2 semester hours*

TE716L

### **Technique Procedures IV: Intermediate Full Spine and Lower Extremity Technique Laboratory**

Intermediate level full spine and lower extremity assessment and manipulative procedures are presented and practiced. Students continue to review and practice previous technique procedures. Prerequisite: TE624L

*4 laboratory hours, 2 semester hours*

TE717L

### **Technique Procedures V: Soft Tissue II**

This course will begin by reviewing soft tissue techniques taught in TE625/TE625L. Students then refine their palpatory and therapeutic soft tissue manual treatment skills. Prerequisite: TE625L

*2 laboratory hours, 1 semester hour*

TE728

### **Technique Procedures VI: Advanced Chiropractic Technique I**

Advanced patient assessment procedures and application of technique procedures to different patient populations are presented and discussed. Upper cervical toggle recoil, instrument adjusting and temporomandibular joint, symphysis pubis, coccyx and rib techniques

# Chiropractic

are introduced. Chiropractic management of extremity conditions is presented and discussed. Prerequisite TE716

*2 lecture hours, 2 semester hours*

TE728L

## **Technique Procedures VI: Advanced Chiropractic Technique I Laboratory**

Previous patient assessment procedures and technique procedures are demonstrated and practiced. Advanced spinal and extremity techniques are introduced and practiced. Upper cervical toggle recoil, pelvic blocking, instrument adjusting, cervical and lumbar mobilization techniques, TMJ, symphysis pubis, coccyx and rib techniques are introduced and practiced. Taping and bracing techniques will be introduced. Soft tissue techniques are reviewed and practiced.

*4 laboratory hours, 2 semester hours*

TE819

## **Technique Procedures VII: Advanced Chiropractic Technique II**

This course is the combined lecture and laboratory review of all techniques taught at UBCC. This course also serves as a critique course for other techniques utilized in practice. Case management utilizing various chiropractic technique approaches are discussed and critically evaluated. Additional techniques, such as taping, massage techniques and an introduction to fascial manipulation are included. Prerequisite: all courses Semester I-VI

*1.5 lecture hours, 3 laboratory hours, 3 semester hours*

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## **Clinical Nutrition**

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CN621

### **Clinical Nutrition I: Pathology and Assessment**

This course introduces the student to disease states and abnormal conditions due to biochemical deficiencies and abnormal metabolic states. Students are introduced to the methods of nutritional assessment through history and observation. Prerequisites: BC511, DX613, PH612, PA611.

*1 lecture hour, 1 semester hour*

CN712

### **Clinical Nutrition II: Treatment and Management**

This course is a continuation of CN621. Students are presented with abnormalities of a nutritional origin and begin to develop a treatment and management plan. Prerequisite: CN621.

*2 lecture hours, 2 semester hours*

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## **Clinical Services**

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CS721

### **Clinical Services I**

Students under the supervision of licensed faculty begin to administer care to patients at the UBCC Health Center. Students are introduced to the procedures and practices utilized by the health center through lectures and practical demonstrations. Students refine their skills in history taking, physical examination, radiology, technique, case management and clinical decision-making. Prerequisites: all courses in semesters I-V.

*2 lecture hours, 4 clinic hours, 4 semester hours*

CS812

### **Clinical Services II**

Under supervision of licensed faculty, interns administer care to patients. All patient diagnoses and management plans are reviewed and approved by a clinic faculty member prior to the initiation of patient care. Students are assessed via evaluation by faculty. Prerequisite: All course semesters I-VI

*25 clinic hours, 12.5 semester hours*

CS823

### **Clinical Services III**

Interns continue to administer care to patients under the supervision and approval of licensed faculty. Interns are monitored as to their progress towards completing the qualitative and quantitative requirements as set forth by the UBCC Health Center. Assessment of an intern's clinical competency is performed by faculty. Prerequisite: All course semesters I-VII.

*25 clinic hours, 12.5 semester hours*

CS824

### **Clinical Services IV**

Interns continue to administer care to patients under supervision of faculty. Progress is monitored by faculty. This clinical experience is presented during the summer for six weeks. Prerequisites: All courses Semesters I-VI

*25 clinic hours, 4 semester hours*

CS900

### **VA Clinical Residency Program**

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## **Diagnosis**

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DX611

### **Diagnostic Skills I: Physical Examination**

This course is designed as an introduction to the skills required to examine, diagnose and differentially diagnose the skin, eyes, ears,

nose, sinuses, mouth, throat and thyroid as well as the cardiovascular, respiratory, gastrointestinal and genitourinary systems. In addition, selected topics regarding the diagnosis of the musculoskeletal system will also be covered. The student will also learn the selection of appropriate examination and diagnostic procedures which correspond to the patient's history and complaint. They will be introduced to the skills as they relate to history taking as well as guidelines for appropriate record keeping and progress notes. Prerequisites: AN511, AN512 and AN525, AN513

*2 lecture hours, 2 semester hours*

DX611L

### **Diagnostic Skills I: Physical Examination: Laboratory**

This practical laboratory course is designed as an introduction to the psychomotor skills required to examine, diagnose and differentially diagnose the skin, eyes, ears, nose, sinuses, mouth, throat, thyroid, cardiovascular, respiratory, gastrointestinal and genitourinary systems. The students will learn the selection of appropriate examination and diagnostic procedures, which correspond to the patient's history and complaint as well as recognize the importance of the review of systems and the development of a problem list. The successful student will learn how to select and use their diagnostic equipment and specific procedures for carrying out these examinations. Prerequisites: AN511, AN513, AN525

*3 laboratory hours, 1.5 semester hours*

DX612

### **Diagnostic Skills II: Orthopedics and Neurology**

This lecture course emphasizes the use of evidenced-based orthopedic and neurological evaluation procedures. Students are introduced to an organized clinical thought process that prepares them to perform appropriate evaluation procedures of patients presenting with neuromusculoskeletal conditions. Prerequisites: AN526, TE522, PP524

*2 lecture hours, 2 semester hours, 4 laboratory hours, 2 semester hours*

DX612L

### **Diagnostic Skills II: Orthopedics and Neurology Laboratory**

This laboratory course accompanies DX612 and emphasizes the use of evidenced-based orthopedic and neurological evaluation procedures. Students are introduced to an organized clinical thought process that prepares them to perform appropriate evaluation procedures of patients presenting with neuromusculoskeletal conditions. Prerequisites: AN526, TE522,

# Chiropractic

PP524

4 laboratory hours, 2 semester hours

DX623

## **Diagnostic Skills III: Orthopedic and Neurology**

The lecture portion of this course covers common diseases and conditions of the neurological system.

2 lecture hours, 2 semester hours

DX623L

## **Diagnostic Skills III: Orthopedic and Neurology Laboratory**

The laboratory portion presents cases that challenge the student to consider the evaluation and management process of specific neurological conditions. Practical application of neurological and orthopedic testing prepares the student to organize their critical skills.

4 laboratory hours, 2 semester hours

DX624

## **Laboratory Diagnosis**

This course focuses on the principle laboratory tests used to evaluate and diagnose various pathological conditions. The student will learn the selection of appropriate laboratory and diagnostic procedures which correspond to the patient's history and complaint. The student will also expand upon their knowledge base from previous courses in physiology and biochemistry in learning about and understanding the rationale behind common laboratory procedures, including serum chemistries, CBC, and urine studies. An introduction to various functional and metabolic studies will also be presented. Prerequisites: DX611, DX611L, PH612, PA611

3 lecture hours, 3 semester hours

DX725

## **Special Populations**

This course introduces the student to the health care needs of the developing child and mother from conception to birth to childhood and adolescence. Complications of pregnancy, delivery, post-partum care and the chiropractic management of the obstetrical patient will be discussed. The examination and conditions of the pediatric patient as well as the management of the pediatric patient is presented. Also covered is the examination of the geriatric patient, common findings of the geriatric exam and management of selected neuromusculoskeletal and non-neuromusculoskeletal conditions. Prerequisites: all courses in semesters I-V.

3 lecture hours, 3 semester hours

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## *Differential Diagnosis*

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DD621

## **Differential Diagnosis I: Ears Eyes Nose Throat**

DD711

## **Differential Diagnosis I: Internal Disorders**

This lecture and skill laboratory course is designed as an introduction to the skills required to examine and differentially diagnose the cardiovascular, respiratory, gastrointestinal and genitourinary systems. Selected topics regarding the endocrine and lymphatic system will also be covered. The student will learn the selection of appropriate examination, diagnostic and therapeutic procedures which correspond to the patient's history and complaint. The student will also expand upon their knowledge base from previous courses in medical interviewing, physical examination, and laboratory diagnosis and learn how to select and use diagnostic equipment, diagnostic tests and specific procedures used in the differential diagnosis of internal disorders. Integration of these skills into the comprehensive management of the patient will be emphasized which will allow the student to properly develop the clinical decision-making skills required of a primary care physician. Prerequisites: DX611/ DX611L, DX624, DX623/DX623L, PA622, PH612, DI623. 5 lecture hours, 2 laboratory hours, 6 semester hours

DD711L

## **Differential Diagnosis I: Internal Disorders Laboratory**

This lecture and skill laboratory course is designed as an introduction to the skills required to examine and differentially diagnose the cardiovascular, respiratory, gastrointestinal and genitourinary systems. Selected topics regarding the endocrine and lymphatic system will also be covered. The student will learn the selection of appropriate examination, diagnostic and therapeutic procedures which correspond to the patient's history and complaint. The student will also expand upon their knowledge base from previous courses in medical interviewing, physical examination, and laboratory diagnosis and learn how to select and use diagnostic equipment, diagnostic tests and specific procedures used in the differential diagnosis of internal disorders. Integration of these skills into the comprehensive management of the patient will be emphasized which will allow the student to properly develop the clinical decision-making skills required of a primary care physician. Prerequisites: DX611/ DX611L, DX624, DX623/DX623L, PA622, PH612, DI623.

5 lecture hours, 2 laboratory hours, 6 semester hours

DD712

## **Differential Diagnosis II: Viscera**

DD722

## **Differential Diagnosis II: Neuromusculoskeletal**

This course is a presentation of the diseases and conditions affecting the neuromusculoskeletal system. Disorders affecting the spine, extremities and central and peripheral nervous system are reviewed. Neurological and orthopedic testing are covered as they relate to the differential diagnosis of these systems. Functioning of the human locomotor system and how other systems can affect this is stressed. Prerequisites: All courses, Semesters I-V 4 lecture hours, 2 laboratory hours, 5 semester hours

DD723

## **Differential Diagnosis III: NMS**

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## *Emergency Procedures*

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ER 711

## **Emergency Procedures**

This course will familiarize the students with emergency situations and procedures that may be seen in the Emergency Department or private practice. The student will learn to discern emergent presentations by review of clinical scenarios and be able to elicit a proper history and physical exam to properly refer or treat the patient in the confines of their scope of practice.

1 lecture hours, 2 semester hours

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## *Microbiology and Public Health*

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MB521

## **Clinical Microbiology I: Introduction to Infectious Diseases**

This course introduces the student to the basic concepts of microbiology with emphasis on the structure, growth, metabolism and genetics of bacteria. Host-parasite relationships of representative bacterial, fungal, viral and protozoan pathogens are examined. A survey of microbial diseases includes modes of transmission, symptoms, diagnosis, physical and chemical methods of disinfection, sterilization and treatment. Presentations include lecture, laboratory and case studies. Prerequisites: BC511, AN511

2 lecture hours, 2 semester hours

# Chiropractic

MB612

## **Clinical Microbiology II: Infectious Diseases**

This course is a continuation of MB521. Common infectious diseases are presented from a microbiological perspective. Prerequisite: MB521, PH521

*2 lecture hours, 2 semester hours*

MB621

## **Microbiology Infectious Diseases**

MB623

## **Public Health I: Introduction to Public Health and Epidemiology**

This course covers the current environmental and public health concerns and issues. The course integrates health with diet, air and water pollutants, nose and substance abuse, compares community hygiene and industrial hygiene, defines epidemiology and recognition of major communicable and non-communicable disease. Prerequisite: MB612.

*2 lecture hours, 2 semester hours*

MB712

## **Epidemiology Public Health**

MB724

## **Public Health II: Community Health and Wellness**

This course emphasizes interventions which promote wellness and prevent disease. Students will learn health risk assessment which will help motivate patients to make lifestyle changes that promote wellness and prevent disease. *2 lecture hours, 2 semester hours*

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## Neuroscience

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NS521

## **Neuroscience I**

This course focuses on the anatomy of the nervous system with special emphasis on sensory and motor systems. However all areas of the central nervous system are discussed to give the student a broad understanding of brain function. Clinical correlations are made which are applicable to each region or system of the CNS. The laboratory section of the course includes presentation of prosections and discussion of case studies. Instruction includes lecture, case studies and demonstration of prosections in the laboratory. Prerequisites: AN511, AN512, AN514.

*3 lecture hours, 3 semester hours*

NS612

## **Neuroscience II**

This course is a continuation of NS521, with the focus on the physiology of the nervous system. The sensory and motor systems are examined in detail. An emphasis is placed on

the correlation of anatomical structure to physiological function and clinical dysfunction. The special sense organs and systems are studied in detail. The laboratory introduces students to neurological tests performed on patients, with an emphasis on understanding the underlying neuro-anatomy and neurophysiology that is the basis for these tests. Prerequisites: NS521, PP523, PH521, AN525.

*3 lecture hours, 3 semester hours*

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## Pathology

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PA611

## **Fundamentals of Pathology**

This course is a study of the pathophysiological process and how this process alters the gross, microscopic and clinical manifestations of disease. Basic processes of inflammation, repair, degeneration, necrosis, immunology and neoplasia is presented. This course is also an introduction to diseases of the lymphatic, hematopoietic, and neuromusculoskeletal system. Laboratory includes the study of gross and microscopic changes as well as clinical presentations of various diseases and functional disturbances. Prerequisites: All anatomy courses, PH521, BC511

*2 lecture hours, 1 laboratory hour, 2.5 semester hours*

PA622

## **Systems of Pathology**

This course is a continuation of PA611. This course emphasizes the pathological basis of systemic diseases of the cardiovascular, respiratory, gastrointestinal, urogenital, endocrine, and renal systems. The gross microscopic and clinical manifestations of various disease processes are presented. Prerequisites: PA611, Corequisite PH612.

*4 lecture hours, 2 laboratory hour, 5 semester hours*

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## Physiological Therapeutics

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PT711/PT711L

## **Physiological Therapeutics I: Modalities**

This course is an introduction to the clinical use of heat, cold, high volt galvanism, interferential current, low volt galvanism, ultrasound, electrical muscle stimulation, diathermy and paraffin. This student is instructed on the development of a clinical management plan utilizing adjunctive therapies. In lab, students are introduced to the use and application of modalities.

*1 lecture hour, 1 semester hour/2 laboratory hours, 1 semester hour*

PT722

## **Physiological Therapeutics II: Rehabilitation**

In this course current concepts of active rehabilitative management of injuries, dysfunctions and conditions of the spine and extremities common to the practice of chiropractic are presented. The student receives instruction in a variety of assessment and clinical management protocols including spinal stabilization, therapeutic exercise, PNF, stretching, sensorimotor training and patient education. The application of outcomes and psychosocial risk factors assessment in developing the treatment plan is addressed.

*2 lecture hours, 2 laboratory hours, 2 semester hours*

PT722L

## **Physiological Therapeutics II: Rehabilitation Laboratory**

In this course current concepts of active rehabilitative management of injuries, dysfunctions and conditions of the spine and extremities common to the practice of chiropractic are presented. The student receives instruction in a variety of assessment and clinical management protocols including spinal stabilization, therapeutic exercise, PNF, stretching, sensorimotor training and patient education. The application of outcomes and psychosocial risk factors assessment in developing the treatment plan is addressed.

*2 lecture hours, 2 laboratory hours, 2 semester hour*

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## Physiology

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PH521

## **Organ System Microscopic Anatomy and Physiology I**

This class will focus on understanding the microscopic anatomy and physiology of the organs of the immune and endocrine systems. Major emphasis will be placed on the role of non-specific and specific defense mechanisms in health maintenance and provide an introduction into immune system disruption as it relates to hypersensitivity and autoimmunity. The endocrine system will be studied in its primary role in cellular communication and maintenance of homeostasis. Special emphasis will be placed on the interaction and communication between the nervous and endocrine systems. Prerequisites: AN511, BC511

*2 lecture hours, 2 semester hours*

# Chiropractic

PH612

## **Organ System Microscopic Anatomy and Physiology II**

The microscopic anatomy and physiology of the cardiovascular, respiratory, digestive and reproductive systems will be introduced. An emphasis will be placed on the relationship of tissue organization and function of the organ systems. Laboratories in this class will utilize case studies to emphasize how an understanding of normal physiologic mechanisms is crucial to understanding pathophysiology. Prerequisites: AN511, PH521.

*4 lecture hours, 2 laboratory hours, 5 semester hours*

PH713

## **Toxicology and Pharmacology**

This course is the study of drugs and chemicals and how they interact with the living organism. Pharmacology is a study of the sites, absorption and metabolism of common drugs. Toxicology studies the adverse reactions of drugs and poisons. The therapeutic use and toxic side effects of various drugs, chemicals, nutritional supplements and other substances are studied. Prerequisites: PH612, PA611, NS612, PA622.

*2 lecture hours, 2 semester hours*

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## **Principles and Practice**

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PP511

### **Principles and Practice I: History and Philosophy**

This is a course in which the history of healing is traced from its known origins through discovery of chiropractic to the present day. The basic concepts of chiropractic philosophy are discussed, as well as their current interpretation and clinical significance. Particular emphasis is placed upon chiropractic as a distinct profession in the health care community.

*2 lecture hours, 2 semester hours*

PP512

### **Principles and Practice II: Introduction to Evidence-Based Practice**

Students will learn the steps involved in Evidence-Based Chiropractic practice: Creating focused clinical questions, efficiently finding, and then assessing evidence for relevance and validity, applying it ethically (alongside clinical wisdom and patient preferences) to a clinical question, then reflecting upon your mastery of the process. This course will build the foundation for an ongoing commitment to inquiry which will support your future clinical decisions and patient care.

*2 lecture hours, 2 semester hours*

PP513

### **Principles and Practice III: Ethics**

Students are introduced to various codes of behavior as they relate to patient relations, advertising, insurance reporting and professional and general personal behavior.

*2 lecture hours, 2 semester hours*

PP523

### **Principles and Practice III: Contemporary Chiropractic Studies**

Historical and contemporary principles of the chiropractic profession are introduced and discussed. Components of the subluxation complex are presented, critically analyzed and incorporated into the science, art and philosophy of contemporary chiropractic practice. Current events regarding chiropractic and health care are presented and discussed.

Prerequisite: PP511

*2 lecture hours, 2 semester hours*

PP524

### **Principles and Practice IV: Subluxation Complex**

This course introduces students to the current concepts of the subluxation complex and how it is integrated with the science, art and philosophy of chiropractic care. The course covers the various components of the subluxation complex, including biomechanical, pathophysiological, and neurological aspects. This information is correlated to the effects of chiropractic manipulation of the subluxation complex. Prerequisite: PP511, AN512.

*2 lecture hours, 2 semester hours*

PP622

### **Principles and Practice VII: Research and Philosophy of Science**

PP624

### **Principles and Practice IV: Evidence-Based Practice**

In this course, students will expand their knowledge of evidence-based practice. The course emphasizes asking clinical questions, searching for the scientific literature to answer those questions and critically appraising that research. Having found valid research to answer the clinical questions, students will learn how to use that information in clinical practice. Prerequisite: PP512

*2 lecture hours, 2 semester hours*

PP715

### **Principles and Practice V: Ethics**

This is a risk management course that stresses the importance of ethical and legal business management procedures. Students learn risk management, jurisprudence, ethics and the informed consent process. Successful comple-

tion will prepare the student to practice as an ethical health care provider.

*1 lecture hour, 1 credit hour*

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## **Psychology**

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PS711

### **Clinical Psychology**

This course is designed to familiarize the student with current psychological theory and practice. The student is instructed in behavioral assessment and the recognition of psychological disorders. Interviewing and counseling techniques are presented as well as the criteria for appropriate referral of patients to providers of psychological services.

*2 lecture hours, 2 semester hours*

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## **Radiology**

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DI521

### **Diagnostic Imaging I: Normal Anatomy**

This course introduces students to normal spinal anatomy including the skull and pelvis. In addition, the students will learn about some abnormal conditions such as scoliosis and spondylolisthesis. Concepts, as they relate to imaging formation, file interpretation and report writing are introduced.

*2 lecture hours, 2 laboratory hours, 3 semester hours*

DI612

### **Diagnostic Imaging II: Normal Anatomy**

This course is a continuation of DI521. Students continue to develop their skills of radiographic interpretation as they relate to normal anatomical structures of the various parts of the body. Emphasis is placed on the radiography of normal anatomical structures of the extremities and chest. Prerequisite: DI521

*1 lecture hour, 2 laboratory hours, 2 semester hours*

DI623

### **Diagnostic Imaging III: Bone Pathology**

This course introduces students to the clinical and radiographic manifestations affecting osseous structures due to neoplasia, such as tumor-like conditions, infection and normal variants. Students are introduced to special imaging as it relates to further evaluation of these conditions. Prerequisite: DI612

*2 lecture hours, 2 laboratory hours, 3 semester hours*

DI714

### **Diagnostic Imaging IV: Arthritis and Trauma**

This course further develops the students' skills

## Chiropractic • Computer Engineering

in the clinical and radiographic manifestation of osseous structures. Emphasis in this course is placed on the interpretation and recognition of disorders due to inflammatory and non-inflammatory arthritis and trauma. Special imaging as they relate to further evaluation of these conditions is presented. Prerequisite: DI623.

*2 lecture hours, 2 laboratory hours, 3 semester hours*

DI725

### Diagnostic Imaging V: Chest and Abdomen

This course covers the interpretation of normal and abnormal clinical and radiographic manifestations of the internal organs. The chest, heart and abdomen are studied on plain film as well as special examination procedures. Prerequisite: All previous DI courses.

*1 lecture hour, 2 laboratory hours, 2 semester hours*

DI726

### Diagnostic Imaging VI: Positioning and Physics

This course covers the mechanics of x-ray production, film processing, x-ray factors and radiation safety and protection for doctor and patient. Also covered is the placement and positioning of patients for the taking of x-ray studies. Students are introduced to the policies and procedures utilized by the UBCC Health Center.

*2 lecture hours, 2 laboratory hours, 3 semester hours*

DI827

### Diagnostic Imaging VII: X-Ray Review

This course discussed the radiographic presentation of osseous pathologies that clinicians may see in field practice. Review of previous and introduction of new conditions is the goal. A more in-depth study of advanced imaging (with focus on MRI) of the areas often clinically discussed is presented. Prerequisites: All courses: Semesters I-VI.

*2 laboratory hours, 1 semester hour*

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## Research

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RS711

### Evidence Based Practice I

This online learning course will utilize previously taught material and evidence-based practice methods in the creation of a comprehensive case report on a fictitious patient. An emphasis is placed on chiropractic principles and techniques as patient management strategies are created. Prerequisite: PP512, PP624

*1 lecture hours, 1 semester hour*

RS722

### Evidence Based Practice II

This online learning course will utilize previously taught material and evidence-based practice methods in the creation of a comprehensive case report on a fictitious patient. An emphasis is placed on chiropractic principles and techniques as patient management strategies are created. Prerequisite: RS711

*1 lecture hours, 1 semester hour*

RS813

### Evidence Based Practice III

Interns compare different interventions based on patients seen by the intern, as approved by their clinician. Interns perform a literature search and report the clinical questions, search terms used; data based searched, papers found and their quality. The intern determines whether a given intervention has quality evidence supporting its use. Interns submit a report summarizing findings and discuss the case with other interns. Clinicians query interns not only regarding the findings, but also how the investigation provides practical application to the patient's care and management plan. Prerequisites: All Courses, Semesters I-VI, Corequisite: CS812

*1 semester hour*

RS824

### Evidence Based Practice IV

Interns compare different interventions based on patients seen by the intern, as approved by their clinician. Interns perform a literature search and report the clinical questions, search terms used; data based searched, papers found and their quality. The intern determines whether a given intervention has quality evidence supporting its use. Interns submit a report summarizing findings and discuss the case with other interns. Clinicians query interns not only regarding the findings, but also how the investigation provides practical application to the patient's care and management plan. Prerequisite: All courses Semesters I-VII, Corequisite: CS823

*1.5 semester hour*

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## Computer Engineering

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COMPUTER ENGINEERING 408

### Operating Systems

Structure and design issues in modern operating systems. Topics may include OS structure; Threads, CPU scheduling and synchronization of processes; deadlock management; main and virtual memory management; file management; file system interface; I/O structure;

Prerequisite: Computer Science 102.

*3 semester hours*

COMPUTER ENGINEERING 415

### Advanced Digital Systems

The objective of this graduate level course is to introduce the modern design methodologies for digital logic and automatic synthesis of digital systems. Students are provided with access to the CAD tools to use hardware description language to model, analyze and design various digital circuits/systems. It is expected that students will acquire a clear understanding of the main techniques, design strategies and the optimizations that are involved in modern digital circuit modeling, design and synthesis. The course projects will include the design and optimization of advanced critical digital systems used in bio-related applications.

COMPUTER ENGINEERING 440

### Image Processing

This is a project-oriented course. Students will learn and implement FFT with applications, image enhancement, image restoration, image compression, and image tomography. Projects will be conducted on workstations. Prerequisite: Electrical Engineering 443.

*3 Lecture hours, 3 semester hours*

COMPUTER ENGINEERING 446 (CEPG 446/ELEG 446)

### MEMS (Micro-Electro-Mechanical Systems)

Basic micro fabrication techniques, MEMS materials and their properties, MEMS device design and simulation, MEMS packaging and assembly, signal testing and MEMS reliability analysis. MEMS industrial applications in various areas will also be discussed. Students used ANSYS FEM software to design and simulate their behavior.

*3 semester hours*

COMPUTER ENGINEERING 447 (CEPG 447/ELEG 447)

### Field Programmable Gate Arrays

Logic design using textual design entry, VHDL. Behavioral, structural and data flow descriptions. Technology-dependent vs. technology-independent design. CPLD, SRAM and antifuse technologies. Rapid prototyping and retargeting designs. A major design project. Prerequisite: Computer Engineering 315.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 448D

### Intro VLSI Desn

Design and implementation of a very large scale integrated circuits. CMOS and BiCMOS technologies, basic topological structure of ICs, clocking characteristics, resistance, capacitance and power estimation, System-level design and implementation issues. Custom lay-

# Computer Engineering

out and verification using CAD tools. Synthesis of designs from VHDL descriptions. Term project will include the design and testing of an integrated circuit. Prerequisites: Computer Engineering 315.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 449

## Senior Project

Major open-ended design project to integrate students' knowledge of hardware and software. Formulation of design specifications, use of design tools, feasibility considerations. Prerequisites: Computer Engineering 312, 387, Engineering 300, English 204, Integrated Studies C101 and senior status.

*1 semester hour*

COMPUTER ENGINEERING 458 (CEPG 458/ELEG 458)

## Analog VLSI

Modeling, design and analysis of analog VLSI circuits. CMOS processing and layout, current mirrors, Opamp, comparators, S/H voltage references, switched-capacitor circuits, data converters, filters and PLLs. Students design analog VLSI layouts, extract the netlists and simulate the circuit behavior. Transistors sizing will also be discussed. EDA tools PSPICE, Mentors Graphics are used.

*3 semester hours*

COMPUTER ENGINEERING 460

## Introduction to Robotics

Basic Robotics, including: position and velocity sensing, actuators, control theory, robot coordinate systems, robot kinematics, differential motions, path control, dynamics, and force control. Robot sensing, simulation of manipulators, automation, and robot programming languages are also investigated. Prerequisites: Computer Science 102, Electrical Engineering 360, Math 214 or 314 or permission of instructor.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 461

## Network Security

Conventional encryption and message confidentiality, public-key cryptography and message authentication. Authentication applications, electronic mail security, IP security, web security, firewalls, security in mobile network and other security systems. Prerequisites: Computer Engineering 471 or Computer Engineering 473.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 470

## Advanced Robotics

Advanced robotics and automation topics and techniques, including: active robotic sensing, intelligent and integrated manufacturing systems,

robotic inspection, observation under uncertainty, multisensor feedback control of manipulators and mobile robots, advanced simulation and monitoring of robotic systems, high level modeling and control, and other topics. Prerequisites: Computer Science 460, Computer Engineering 460 or permission of instructor.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 471

## Data and Computer Communications

Introduction to data communication. Frequency response, bandwidth, filtering and noise. Fourier series and Fourier transform. Information theory concepts: Nyquist's theorem, Shannon's and Sampling theorems. Analog and digital modulation techniques. Pulse Code Modulation (PCM). Communication systems circuits and devices. Data encoding. Physical layer protocols. Data link control (point to point communication, design issues, link management, error control, flow control). Multiplexing and switching. Prerequisite: Computer Engineering 210.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 472

## Computer Networks

Introduction to fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics to be covered include: overview of network architectures, applications (HTTP, FTP), network programming interfaces (e.g., sockets), transport (TCP, UDP), flow control, congestion control, IP, routing, IPv6, multicast, data link protocols, error detection/correction, multiple access, LAN, Ethernet, wireless networks, and network security. Prerequisite: Computer Engineering 471 or permission from instructor.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 473

## Local Area Networks

Examination of wired and wireless Local and Metropolitan Area Network technologies, protocols, and the methods used for implementing LAN and MAN based enterprise intranets. The IEEE 802 media access control (MAC) protocols are examined. The 802.2 logical link control, 802.3/Ethernet, 802.3 token bus, and the 802.5 token ring protocols are analyzed, and the construction of LAN-based enterprise instruments is examined through a detailed analysis of bridging, routing, and switching techniques. High-speed LAN technologies are discussed through an examination of FDDI, Fast Ethernet, 100VG AnyLAN, ATM LAN

and fiber Channel protocols along with the standards for Gigabit and 10 Gigabit Ethernet. The new and emerging wireless LAN and MAN standards are also examined. The 802.11 (WiFi) wireless LAN and 802.15 (Bluetooth) wireless PAN standards are discussed. Prerequisite: Computer Engineering 471.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 481

## Mobile Communications

This course covers the basic technologies in the field of wireless and mobile communications. The following topics are covered in the course: wireless transmission, media access control, satellite systems, broadcast systems, wireless LANS, wireless ATM, network layer protocols, transport protocols and support for mobility. Prerequisites: Computer Engineering 471 or Computer Engineering 472 or permission of instructor.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 482

## Network Administration

Internetworking basis. Bridging and Switching Fundamentals. Routing basic. Network management fundamentals. Network architecture. Security. Troubleshooting. Prerequisites: Computer Engineering 471 or Computer Engineering 473 and permission of instructor.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 484

## Machine Perception

An introduction to sensing and machine vision. Vision algorithms that are usable in practical applications, sensing mechanisms and various types of sensed data representation, sense data processing and interpretation for different applications. Prerequisites: Computer Science 400, Computer Engineering 312 and Electrical Engineering 443.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 485

## Computer Vision

A project-oriented course designed to familiarize the student with the computer image display, processing, and various limitations. The processing includes edge detection, Hough transform, thinning algorithms, moment invariant methods, relaxation algorithms, among others. Prerequisite: Computer Science 400, Computer Engineering 312, Electrical Engineering 443.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 488

## Interactive Computer Graphics

*3 semester hours*

# Computer Engineering

COMPUTER ENGINEERING 489

## Software Engineering

Structural development methodology for large software systems. Planning requirements, design, test, and validation. Advanced topics in software development. Prerequisite: Computer Engineering 489.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 496

## Digital Signal Processing Laboratory

*3 semester hours*

COMPUTER ENGINEERING 497A

## Advanced Problem in Computer Engineering

*1 semester hour*

COMPUTER ENGINEERING 497B

## Advanced Problem II in Computer Engineering

*1 semester hour*

COMPUTER ENGINEERING 500

## Graduate Co-op/Internship in Computer Engineering

By arrangement.

*1-3 semester hours*

COMPUTER ENGINEERING 506

## Mobile and Pervasive Computing

Students will learn the fundamentals of mobile computing and pervasive computing. Students will learn how to design and develop mobility-aware systems. Students will study the main standards of pervasive computing. Also, they will study mobile platforms environments, location awareness and wearable computing.

*3 semester hours*

COMPUTER ENGINEERING 510

## Introduction to Computer Architecture

Instruction set; data path and controller design for computers. Design and analysis of a RISC processor including integer and floating point pipeline design. Cache and virtual memory design, interrupts and DMA. Prerequisite: Computer Engineering 312 or equivalent background.

*3 lecture hours, 3 semester hours*

COMPUTER ENGINEERING 513

## Biomedical Image Processing

This course is an elective course. The content of this course include the fundamentals of Digital Image Processing and its applications in biomedical field. Sampling and Quantization of signals are mentioned in order to introduce the digital images, some basic relationship between pixels are mentioned. Introduction to Fourier Transform, Discrete Fourier Transform and Fast Fourier Transformed are explained. MATLAB programming with Image Processing Toolbox will be introduced to empathize and

rigid the understanding of students. Others important fundamental theorems, e.g., Image Enhancement, Image Segmentation, Representation and Description are also mentioned. Students are required to implement some program using theorems learnt in classes.

*3 semester hours*

COMPUTER ENGINEERING 515

## Advanced Digital Systems

The objective of this graduate level course is to introduce the modern design methodologies for digital logic and automatic synthesis of digital systems. Students are provided with access to the CAD tools to use hardware description language to model, analyze and design various digital circuits/systems. It is expected that students will acquire a clear understanding of the main techniques, design strategies and the optimizations that are involved in modern digital circuit modeling, design and synthesis. The course projects will include the design and optimization of advanced critical digital systems used in bio-related applications.

*3 semester hours*

COMPUTER ENGINEERING 540

## Image Processing

This is a project-oriented course. Students will learn and implement FFT with applications, image enhancement, image restoration, image compression, and image tomography. Projects will be conducted on workstations. Prerequisite: Electrical Engineering 443.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 548 (CEG 548/ELEG 548)

## Low Power VLSI Circuit Design

With the rapid development of mobile computing, low power VLSI design has become a very important issue in the VLSI industry. A variety of low-power design methods are employed to reduce power dissipation of VLSI chips. This course is designed to cover low-power design methodologies at various design levels (from system level to transistor level). The basic low-power design strategies will be introduced in the class. Students will use the learned knowledge to design low-power VLSI circuits. Upon completion of this course, students will be able to analyze the power consumption of VLSI circuits, and design low-power VLSI circuits using various strategies at different design levels. The major target is to design VLSI chips used for battery-powered systems and high-performance circuits not exceeding power limits.

*3 semester hours*

COMPUTER ENGINEERING 550

## Advanced VLSI Design

Implementation of custom VLSI designs, digital and analog simulation, fault tolerant design, design for testability. A major project will include the implementation of a digital integrated circuit. Prerequisites: Computer Engineering 448D.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 560

## Performance Evaluation and Analysis

This course covers the basic theory and practice of computer systems performance evaluation. The course focuses on three major aspects of performance analysis, measurement, simulation and analytical modeling using queuing theory. The topics will include measurement techniques, monitor tools, simulation models, stochastic processes, queuing theory and analytical modeling techniques. Prerequisite: Computer Engineering 312, Computer Engineering 510 and Mathematics 323.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 561

## Network Security

Conventional encryption and message confidentiality, public-key cryptography and message authentication. Authentication applications, electronic mail security, IP security, web security, firewalls, security in mobile network and other security systems. Prerequisites: Computer Engineering 471 or 473.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 562

## Cryptography and Cryptanalysis

Student will learn advanced topics in Cryptography and Cryptanalysis including: Classical Encryption Techniques, Block Ciphers and the Data Encryption Standard, Finite Fields, Advanced Encryption Standard, Block Cipher Operation, Random Bit Generation and Stream Ciphers, Public-Key Cryptography and Cryptosystems, Cryptographic Hash Functions, Advanced Cryptanalysis techniques and tools. This course includes a research project involves state-of-the art cryptography and cryptanalysis algorithms/tools.

*3 semester hours*

COMPUTER ENGINEERING 563

## Applications Security

This course covers the very important area of application security providing useful examples of how security can be compromised in an application and what preventive measures should be taken from code development and deployment point of view. Topics covered

## Computer Engineering • Computer Science

include validation, cross-site scripting (XSS) and cross-site request forgery (CSRF), securely accessing databases and safeguarding against SQL injection attacks, encryption, hashing and preventing information leaks, methods for authenticating and authorizing users, including membership providers and preventing cookie theft, securing and locking down web server, ways to securely use web services, security with Ajax. Web API (Restful services) and MVC frameworks.

*3 semester hours*

COMPUTER ENGINEERING 570

### Advanced Robotics

Advanced robotics and automation topics and techniques, including: active robotic sensing, intelligent and integrated manufacturing systems, robotic inspection, observation under uncertainty, multisensor feedback control of manipulators and mobile robots, advanced simulation and monitoring of robotic systems, high level modeling and control, and other topics. Prerequisites: Computer Science 460 or Computer Engineering 460.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 572

### Data and Computer Comm

*3 semester hours*

COMPUTER ENGINEERING 577

### Internet of Things

This course focuses on a new emerging topic - The Internet of Things (IoT) and Machine-to-Machine Communications (M2M). The course includes a good amount of background review to get all students to an equivalent level, but primarily lectures will follow a seminar style structure. This implies course work includes readings, presentations and discussion of technical papers taken from the currently available IoT literature. Seminar style requires active student participation in both the presentations and in the discussions. Prior to the class / seminar, students are required to review an assigned article. Then we will have a thorough and interactive discussion in the classroom. The course syllabus will intentionally adapt to the interests and backgrounds of the students. This course will focus more narrowly on just a few key areas. Class lectures will be a combination of review of relevant networking material and presentation of papers from the current literature on the Internet of Things. Depending on length and complexity, the class will typically cover one or more research papers per week in class. Students should try to submit papers that they would be both qualified and interested in presenting

in class. Prerequisites: Computer Engineering 472, Computer Engineering 572, or Computer Engineering 481.

*3 semester hours*

COMPUTER ENGINEERING 585

### Computer Vision

A project-oriented course designed to familiarize the student with the computer image display, processing, and various limitations. The processing includes edge detection, Hough transform, thinning algorithms, moment invariant methods, relaxation algorithms, among others. Prerequisite: Computer Science 400, Computer Engineering 312, Electrical Engineering 443.

*3 lecture hours; 3 semester hours*

COMPUTER ENGINEERING 586

### Deep Learning

*3 semester hours*

COMPUTER ENGINEERING 587

### Embedded System Design

Design of systems having major hardware and software components. Software implementations are used to control specific hardware such as micro controllers. Major laboratory emphasis to realize embedded systems.

*3 semester hours*

COMPUTER ENGINEERING 597 A

### Advanced Problems-Computer Engineering

Lecture hours and topics to be arranged with Department Chair.

*1 semester hour*

COMPUTER ENGINEERING 597 B

### Advanced Problems-Computer Engineering

Lecture hours and topics to be arranged with Department Chair.

*2 semester hours*

COMPUTER ENGINEERING 597 C

### Project III

Lecture hours and topics to be arranged with Department Chair.

*1 semester hour*

COMPUTER ENGINEERING 598

### Thesis in Computer Engineering

Lecture hours, semester hours and topics to be arranged with Department Chair.

*3-6 semester hours*

COMPUTER ENGINEERING 599

### Independent Study in Computer Engineering

Independent study of advanced topics in Computer Engineering and submission of project report as required. Problem assignment to be arranged with and approved by the Department Chair.

*3 semester hours*

COMPUTER ENGINEERING 606

### Quantum Computing

Classical Computing versus Quantum Computing, Basic Quantum Theory. Quantum Gates and Circuits. Quantum Algorithms. Quantum Programming Language. Deterministic and Nondeterministic Computations. Quantum Cryptography. Quantum Information Theory Quantum Hardware.

*3 semester hours*

COMPUTER ENGINEERING 660

### Navigation & Control of UAVs

The course objective is twofold: i) To provide a comprehensive study of unmanned fixed-wing and rotorcraft navigation and control techniques, including a review of kinematics, dynamics and equations of motion, sensors, identification, controller design and implementation, as well as advances in unmanned aviation technology. ii) To present a detailed methodology for designing and navigating/controlling a new type of fixed-wing aircraft with enhanced aerodynamic performance based on the concept of Circulation Control, which allows for lift enhancement, reduce takeoff and landing distance, delayed stall and increased effective payload. CC based aircraft design is followed by controller design that also includes identification of stability and control derivatives.

*3 semester hours*

COMPUTER ENGINEERING 678

### Adv Wireless Sensor Networks

Wireless Sensor Network Applications. Factors Influencing Wireless Sensor Network Design. Physical Layer. Medium Access Control (MAC). Network Layer. Transport Layer. Time Synchronization. Localization. Topology Management. Wireless Sensor and Actor Networks. Wireless Multimedia Sensor Networks. Wireless Underwater Sensor Networks. Wireless Underground Sensor Networks.

*3 semester hours*

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## Computer Science

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COMPUTER SCIENCE 400

### OOP and Design Patterns

This course introduces the modern object oriented programming philosophy using C++ to the beginning graduate students. The emphasis is on developing the programming thought process in terms of objects and their interactions to each other. Concepts covered include data hiding, code reuse through inheritance, polymorphism, templates, exception handling,

# Computer Science

developing appropriate class hierarchy and code maintenance for large software projects. Prerequisites: Computer Science 102 or equivalent background.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 410

## Java Programming

Object oriented programming, using Java, packages, interfaces, multi-threading, classes, inheritance, exceptions, interfaces, native methods, applets. Prerequisite: Computer Science 400.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 411

## Advanced Object-Oriented Programming with JAVA

Covered topics include advanced features of Java, such as Database inter-connectivity (JDBC) with Servlets and JSP, remote method interface (RMI), distributed applications objects using CORBA and JNDI, Java Beans, introspection and reflection, Enterprise Java applications with EJB, interfacing Java to C++ with JNI, and additional advanced topics. A focus on developing components and packages. A major project is developed. Prerequisite: Computer Science 410.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 435

## Unix System Programming

Introduction to shell programming and system in Unix/Linux environments. Various commands, tools, filters and specification languages are studied. System calls to deal with files, processes, pipes, three interprocess communication facilities (semaphores, shared memory, and message queue), and signals are introduced. Prerequisite: Computer Science 400. *3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 440

## Windows Programming

This course covers Graphical User Interface (GUI), design and Windows programming using Visual C++ and Microsoft Foundation Class (MFC) library. Topics covered include windows architecture, message/event driven programming, designing Dialog based, SDI and MDI applications, Document/View architecture, Device Contexts, Database access using the MFC ODBC classes and ADO. A comprehensive project is assigned towards the end of the course, which covered important windows programming concepts. Prerequisite: Computer Science 400.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 441

## Smartphone App Development

*3 semester hours*

COMPUTER SCIENCE 460

## Introduction to Robotics

Basic robotics including: position and velocity sensing, actuators, control theory, robot coordinate systems, robot kinematics, differential motions, path control, dynamics and force control. Robot sensing, simulation of manipulators, automation and robot programming, languages are also investigated. Prerequisite: Computer Science 102, Math 214 or 314, or permission of instructor.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 485

## Software Design Patterns

Introduce design patterns and software architectures. Combines pattern theory with examples to show why and when to use patterns and how to implement them. How to apply design patterns at the enterprise level. The use of design patterns to design and implement systems of high stability and quality. Compare and contrast patterns, including differences between Mediator and Façade. Discuss relationships between patterns. Study how patterns are collaborated within domains to solve complicated problems.

*3 semester hours*

COMPUTER SCIENCE 449A

## Senior Project

Student will initiate and complete a project that meets career interests and objectives. One or more faculty will be available to each student in a consulting capacity. The department chair must approve an outline of the project in the semester prior to registration for this course.

*1 semester hour*

COMPUTER SCIENCE 449B

## Senior Project

Student will initiate and complete a project that meets career interests and objectives. One or more faculty will be available to each student in a consulting capacity. The department chair must approve an outline of the project in the semester prior to registration for this course.

*3 semester hours*

COMPUTER SCIENCE 450

## Database Design

Survey of data structure used in data bases, relations, hierarchical and network data models, theoretical issues in data base processing, practical issues in data base design. Programming and implementation. Prerequisite: Computer Science 400.

*3 semester hours*

COMPUTER SCIENCE 460

## Intro to Robotics

Basic robotics including: position and velocity sensing, actuators, control theory, robot coordinate systems, robot kinematics, differential motions, path control, dynamics, and force control. Robot sensing, simulation of manipulators, automation, and robot programming languages are also investigated. Prerequisite: Computer Science 102, Match 214 or Math 314, or permission of instructor.

*3 semester hours*

COMPUTER SCIENCE 497A

## Advanced Problems-Computer Science

By arrangement.

*1 semester hour*

COMPUTER SCIENCE 497B

## Advanced Problems-Computer Science

By arrangement.

*2 semester hours*

COMPUTER SCIENCE 500

## Graduate Co-op/Internship in Computer Science

By arrangement

*1-3 semester hours*

COMPUTER SCIENCE 501

## OOP and Design Patterns

This course introduces the modern object-oriented programming philosophy using C++ to the beginning graduate students. The emphasis is on developing the programming thought process in terms of objects and their interactions to each other. Concepts covered include data hiding, code reuse through inheritance, polymorphism, templates, exception handling, developing appropriate class hierarchy and code maintenance for large software projects. Prerequisite: Computer Science 102 or equivalent background.

*3 Lecture hours, 3 semester hours*

COMPUTER SCIENCE 502

## Analysis of Algorithms

A course in advanced data structures and high-level algorithms. Varied uses of recursion. Graph representations and algorithms including traversals, path finding, closure, and spanning trees. Sorting files. Weighted and balanced trees; Hashing and collision handling. Complexity and analysis of algorithms. Prerequisite: Computer Science 102 or equivalent.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 503

## Operating Systems

An advanced implementation oriented course in structure and design of operating systems.

# Computer Science

Scheduling and time management; processes and operating systems primitives; Deadlock handling techniques in operating systems; Space management and external device management. Prerequisite: Computer Science 102, Computer Engineering 312, Knowledge of C/C++.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 504

### Artificial Intelligence

Foundations of the theory of Artificial Intelligence. Game playing, pattern recognition, description of cognitive processes, heuristic decision procedures, general problem solvers. Learning and robotics. Discussion of the relationship with human thought process. Extensive Lisp programming. Prerequisite: Computer Science 102 or permission of instructor.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 506

### Mobile and Pervasive Computing

Students will learn the fundamentals of mobile computing and pervasive computing. Students will learn how to design and develop mobility-aware systems. Students will study the main standards of pervasive computing. Also, they will study mobile platforms environments, location awareness and wearable computing.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 509

### Automata Theory

Theory of automata and learning machines. Finite-state sequential machines and functions. Transition preserving functions, Generators and minimal generating sets. Input semigroup, Isomorphisms and Auto-morphisms. Prerequisite: Computer Science 227.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 520

### Theory of Computation

Finite automata and Pushdown automata; Register machines; Recursive functions and sets; Languages, regular expressions; Context-free languages; Regular and context-free grammars; Pumping lemmas. Turing machines, Church-Turing thesis. Post-correspondence problem; Computability and complexity. Prerequisite: Computer Science 227 and knowledge of computer programming.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 545

### Component Based Software Design

Modern component based software design approaches using both the Component Object Model (COM) as well as the CORBA technologies. In-depth look at the infrastructure of COM

components presenting of concepts of class factories, interfaces (standard and custom), in-proc and local server components, IDL, type libraries, proxy/stubs and marshalling, automation and I Dispatch interface, structured storage and ActiveX controls. The distributed form of COM referred to as DCOM and its newest form is known as COM+, which integrates the transaction, and queuing capabilities are examined. A comparison of the CORBA technology is made by explaining its architecture and remoting capabilities. Prerequisite: Computer Science 440, Prerequisite by topic: 1. Good background in C++ programming, 2. Some knowledge of Windows Programming.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 546

### Services-Oriented Arch. (SOA)

The issues in multimedia (audio, images and video), multimedia compression, multimedia operating systems, multimedia communications, multimedia indexing, querying and retrieving, and web database systems, which have been enormously developed recently, and are playing important roles in the areas of business, entertainment, medicine and education. The goal of this course is to give in-depth understanding to media themselves with emphases on other issues related to DBMS, operating systems and communications.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 550

### Multimedia Database Systems

The issues in multimedia (audio, images and video), multimedia compression, multimedia operating systems, multimedia communications, multimedia indexing, querying and retrieving, and web database systems, which have been enormously developed recently, and are playing important roles in the areas of business, entertainment, medicine and education. The goal of this course is to give in-depth understandings to media themselves with emphases on other issues related to DBMS, operating systems and communications.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 551

### Advanced Database

Advanced study of Relational databases including indexing structure, query optimization, rule and cost-based optimization, transactions and concurrency, recovery techniques, security, distributed database, data mining and other emerging database technologies. Prerequisite: Computer Science 450.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 552

### Data Mining

This course is dealing with basic concepts, tasks, methods, and techniques in data mining. The focus is on various data mining problems and their solutions, such as association rules, classification, and clustering analysis. Students will learn various techniques for data mining, and applying the techniques to for data mining, and apply the techniques to solve data mining problems.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 555

### Web-Based Application Development

Introduction to fundamental issues in designing a web-based application. Review of the web technologies such as HTML, VBScript, JavaScript, DHTML, Java, XML and server-side technologies using Active Server Pages (ASP), CGI and Java Server Pages (JSP). Design issues include the creation of tiered and scalable applications by the use of COM+ components involving Microsoft Transaction Server and the Java approach of Enterprise Java Beans. Different projects are assigned to create dynamic, database-driven E-Commerce solutions involving, order tracking systems, inventory management, advertising management, creating score reports, personalizing the shopping experience and secure credit card transactions. Wireless E-Commerce applications and developing business-to-business application using XML, SOAP and Biztalk Servers. Prerequisite: Computer Science 400.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 560

### Performance Evaluation and Analysis

This course covers the basic theory and practice of computer systems performance evaluation. The course focuses on three major aspects of performance analysis, measurement, simulation and analytical modeling using queuing theory. The topics will include measurement techniques, monitor tools, simulation models, stochastic processes, queuing theory and analytical modeling techniques. Prerequisite: Computer Engineering312, Mathematics 323 Background in computer architecture and probability and consent of the instructor.

*3 lecture hours; 3 semester hours*

## COMPUTER SCIENCE 561

### Network Security

Conventional Encryption and Message Confidentiality, Public-key Cryptography and Message Authentication. Authentication Applications, Electronic Mail Security, IP Security, Web Security, Firewalls, Security in Mobile Network

# Computer Science

and other Security Systems. Prerequisite: Computer Engineering 471 or 473.

*3 lecture hours, 3 semester hours*

COMPUTER SCIENCE 562

## **Cryptography and Cryptanalysis**

Student will learn advanced topics in Cryptography and Cryptanalysis including: Classical Encryption Techniques, Block Ciphers and the Data Encryption Standard, Finite Fields, Advanced Encryption Standard, Block Cipher Operation, Random Bit Generation and Stream Ciphers, Public-Key Cryptography and Cryptosystems, Cryptographic Hash Functions, Advanced Cryptanalysis techniques and tools. This course includes a research project involves state-of-the art cryptography and cryptanalysis algorithms/tools.

*3 lecture hours, 3 semester hours*

COMPUTER SCIENCE 563

## **Applications Security**

This course covers the very important area of application security providing useful examples of how security can be compromised in an application and what preventive measures should be taken from code development and deployment point of view. Topics covered include validation, cross-site scripting (XSS) and cross-site request forgery (CSRF), securely accessing databases and safeguarding against SQL injection attacks, encryption, hashing and preventing information leaks, methods for authenticating and authorizing users, including membership providers and preventing cookie theft, securing and locking down web server, ways to securely use web services, security with Ajax. Web API (Restful services) and MVC frameworks.

*3 lecture hours, 3 semester hours*

COMPUTER SCIENCE 570

## **Advanced Robotics**

Advanced robotics and automation topics and techniques, including: active robotic sensing, intelligent and integrated manufacturing systems, robotic inspection, observation under uncertainty, multisensor feedback control of manipulators and mobile robots, advanced simulation and monitoring of robotic systems, high level modeling and control, and other topics. Prerequisites: Introduction to Robotics (Computer Science 460 or Computer Engineering 460).

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 571

## **Cloud Computing**

The purpose of this course is to provide introduction to Cloud Computing. Cloud Comput-

ing is a new paradigm of computing, where compute resources, infrastructure, platform and software are delivered as services that are optimized for scalability, performance, high availability and cost. In this course, we will delve in the building blocks of Cloud Computing and learn how we can leverage it for more efficient computing. The course will constitute lectures and hands-on labs).

*3 semester hours*

COMPUTER SCIENCE 584

## **Machine Perception**

An introduction to sensing and machine vision. Vision algorithms that are usable in practical applications, sensing mechanisms and various types of sensed data representation, sense data processing and interpretation for different applications. Prerequisite: Computer Science 400, Computer Engineering 312.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 590

## **Parallel and Distributed Processing**

Models of parallel computation including distributed, multiprocessor, multicomputer. Parallel programming constructs. The mutual exclusion problem, synchronization and communication methods. Multi-computer topologies and topologies and topological embedding. Classes of parallel algorithms and design approaches. Performance analysis of parallel computation, including de-tailed and high level. A major project is required. Prerequisite: Computer Science 400.

*3 lecture hours; 3 semester hours*

COMPUTER SCIENCE 597 A

## **Master's Project**

Lecture hours and topics to be arranged with Department Chair.

*1 credit hour*

COMPUTER SCIENCE 597 B

## **Master's Project**

Lecture hours and topics to be arranged with Department Chair.

*2 credit hours*

COMPUTER SCIENCE 597 C

## **Master's Project (completion)**

Lecture hours and topics to be arranged with Department Chair.

*1 credit hour*

COMPUTER SCIENCE 598

## **Thesis in Computer Science**

Lecture hours, semester hours and topics to be arranged with Department Chair.

*3-6 credit hours*

COMPUTER SCIENCE 599

## **Independent Study in Computer Science**

Independent study of advanced topics in Computer Science and submission of project report as required. Problem assignment to be arranged with and approved by the Department Chair.

*3 credit hours*

COMPUTER SCIENCE 604

## **Adv Artificial Intell Concept**

Prerequisite: Computer Science 505.

*3 credit hours*

COMPUTER SCIENCE 605

## **Adv Expert System Design**

*3 credit hours*

COMPUTER SCIENCE 606

## **Quantum Computing**

Classical Computing versus Quantum Computing, Basic Quantum Theory. Quantum Gates and Circuits. Quantum Algorithms. Quantum Programming Language. Deterministic and Nondeterministic Computations. Quantum Cryptography. Quantum Information Theory. Quantum Hardware.

*3 credit hours*

COMPUTER SCIENCE 651

## **Big Data Systems & Analysis**

Program or Course Description: This course will introduce the state-of-arts computing platforms with the focus on how to utilize them in processing (managing and analyzing) massive datasets. Specifically, we will discuss the MapReduce (Hadoop) framework, which provides the most accessible and practical means of computing in the Cloud. We will also introduce the emerging distributed database and services, such as HBase, Pig/Hive for large scale data analysis. Finally, we will utilize several key data processing tasks, including simple statistics, data aggregation, join processing, frequent pattern mining, data clustering, information retrieval, and other machine learning analytics as the case study for large scale data processing.

*3 credit hours*

COMPUTER SCIENCE 652

## **Hadoop and NoSQL DB**

*3 credit hours*

COMPUTER SCIENCE 692

## **Special Topics-CPSC**

Course offered to allow special topics courses in the general area of Computer Science that do not fit into any of the available areas of specialization.

*3 lecture hours; 3 credit hours*

## Computer Science • Computer Science & Engineering • Counseling

COMPUTER SCIENCE 693

### Special Topics-CPEG

3 lecture hours; 3 credit hours

COMPUTER SCIENCE 694

### Written Comprehensive Exam

Students taking comprehensive examinations are required to register for CSE 694.

0 lecture hours, 0 semester hours

COMPUTER SCIENCE 698

### PHD Tchg Requirement

By Arrangement

COMPUTER SCIENCE 699

### Oral Exam

Seminar is a zero credit course. It involves attending the regular departmental seminars and presenting one's work in one of the seminars.

0 lecture hours, 0 semester hours

COMPUTER SCIENCE 710

### Ph.D. Dissertation

The student is expected to work on the accepted topic and come up with original results. S/he has to report the results in the form of a Ph.D. dissertation. The student is encouraged to document the intermediate results in the form of technical reports. S/he is also encouraged to publish these results as they are discovered, in the international professional literature, i.e., refereed conference proceedings and journals. Proof of good work is the acceptance of the results by reputed journals. Intermediate results can also be discussed in departmental seminars. The completed dissertation must be distributed to the dissertation committee members at least two weeks before the dissertation defense. The committee will read it and certify that the dissertation is a work of substantial merit and that it can be defended. It is the responsibility of the student that the final draft of the dissertation addresses all legitimate concerns of the committee members.

1-12 semester hours

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## Computer Science & Engineering (Ph.D.)

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These courses are open for students enrolled in the Ph.D. degree in Computer Science and Engineering.

COMPUTER SCIENCE & ENGINEERING 690

### Independent Study

Course taken up by a student with a faculty member on a special topic that may not be broad enough to be offered as a regular course.

3 lecture hours, 3 semester hours

COMPUTER SCIENCE & ENGINEERING 692

### Special Topics in Computer Science

Course offered to allow special topics courses in the general area of Computer Science that do not fit into any of the available areas of specialization.

3 lecture hours, 3 semester hours

COMPUTER SCIENCE & ENGINEERING 693

### Special Topics in Computer Engineering

Course offered to allow special topics courses in the general area of Computer Engineering that do not fit into any of the available areas of specialization.

3 lecture hours, 3 semester hours

COMPUTER SCIENCE & ENGINEERING 694

### Written Comprehensive Examinations

Students taking comprehensive examinations are required to register for CSE 694.

0 lecture hours, 0 semester hours

COMPUTER SCIENCE & ENGINEERING 698

### Teaching Requirement

Ph.D. students assigned teaching courses to fulfill the teaching practicum of the Ph.D. in Computer Science and Engineering are required to register CSE 698.

0 lecture hours, 3 semester hours

COMPUTER SCIENCE & ENGINEERING 699

### Seminar (Oral Exam)

Seminar is a zero credit course. It involves attending the regular departmental seminars and presenting one's work in one of the seminars.

0 lecture hours, 0 semester hours

COMPUTER SCIENCE & ENGINEERING 710

### Ph.D. Dissertation

The student is expected to work on the accepted topic and come up with original results. S/he has to report the results in the form of a Ph.D. dissertation. The student is encouraged to document the intermediate results in the form of technical reports. S/he is also encouraged to publish these results as they are discovered, in the international professional literature, i.e., refereed conference proceedings and journals. Proof of good work is the acceptance of the results by reputed journals. Intermediate results can also be discussed in departmental seminars. The completed dissertation must be distributed to the dissertation committee members at least two weeks before the dissertation defense. The committee will read it and certify that the dissertation is a work of substantial merit and that it can be defended. It is the responsibility of the student that the final draft of the dissertation addresses all legitimate concerns of the committee members.

Varies from 1-12 semester hours

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## Counseling

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COUNSELING 503

### Orientation in Student Affairs

The course provides an overview of Master of Science in Counseling, specifically the College Student Personnel Concentration. The course reviews competencies and expectations of the profession, professional research and writing, as well as the principles of sound practice in Student Affairs.

1 semester hour

COUNSELING 505

### Helping Relationships

This course provides a definitive view of COUNSELING including the characteristics of the counselor and the elements of the COUNSELING process. Through experiential exercises and videotaped simulated COUNSELING the student will attain skills such as attending, empathic listening, assessing and focusing on important client concerns, structuring the process, and facilitating change. COUN 505H is geared specifically to the needs of Human Resources professionals.

3-4 semester hours

COUNSELING 512

### COUNSELING Theories

This course surveys the major theories and perspectives of COUNSELING including the Psychoanalytic, Behavioral, Humanistic-Existential, Cognitive, Constructivist-Post Modern, and Systems approaches along with an integrated, eclectic or confluent perspective. Students gain an understanding of the role of theory, the philosophical basis of the theories, the divergent methods utilized, and the utility of each perspective.

3 semester hours

COUNSELING 515

### Clinical Skills for Mental Health Counseling

The focus of this course is the skills necessary to work in a psychotherapeutic venue including treatment planning, report writing and diagnosis. The course covers description and diagnosis of the mental disorders as prescribed by the Diagnostic and Statistical Manual.

3 semester hours

COUNSELING 520

### Introduction to Student Affairs

This course provides an overview of the purpose and functions of student affairs, including the role of the Student Affairs Professional on a college campus. Through the study of theoretical perspectives and empirical data, you learn to describe different elements and types

## Counseling

of educational environments and understand their effect on different types of students. Students will understand and apply theories/environment interaction in a collegiate setting. *3 semester hours*

COUNSELING 524

### **Strategies and Techniques of Counseling**

Building on basic listening skills this course focuses on developing strategies and interventions that promote therapeutic movement for the client. Techniques of the various theoretical orientations will be presented and practiced. Simulated role plays and videotaped sessions provide active opportunities to develop the skills. This course has significant out of class expectations. Prerequisites include completion of at least 9 credits and COUNSELING 505 and 523.

*3-4 semester hours*

COUNSELING 527

### **Student Affairs Administration**

This course is an introduction to the administration of higher education institutions in the United States. Course material includes an overview of history, purposes, formal structure, governance, finances, and administrative behavior.

*3 semester hours*

COUNSELING 530

### **Intro Family Counseling**

This course examines the history of family counseling, the stages of family development, philosophical basis and major theoretical approaches to family counseling. Ethical issues and guidelines specific to family COUNSELING in alignment with Ethical Standards of the American COUNSELING Association and the American Association for Marriage and Family Therapy will be discussed.

*3 semester hours*

COUNSELING 535

### **Principles of Applied Research**

This course provides a grounding in the methodology of social science research as it pertains to the human service field. It addresses the following four content areas: 1) The nature of social science research; 2) Critical analysis of social science research, 3) Simple descriptive and inferential statistics, and 4) Action research design.

*3 semester hours*

COUNSELING 538

### **Guided Research in Counseling**

This course provides an opportunity for students to engage in research in the field of Counseling. Involves individual reading and research

in COUNSELING involving experimental or theoretical investigation. Prerequisites: COUNSELING 535 or COUNSELING 536; completion of 18 credits in COUNSELING classes.

*1-3 semester hours*

COUNSELING 540

### **Group Process: Application and Theory**

The course focuses on the dynamics of leadership and various membership roles. Alternative theoretical models of groups will be studied. An experiential group experience is required. COUNSELING 505 and 508 are prerequisites. COUN 540 is geared specifically to the needs of Human Resource professionals. Additional unscheduled lab time is required.

*4 semester hours*

COUNSELING 545

### **Social and Cultural Foundation**

This course examines how social and cultural factors impact on the individual and subsequently how the counselor attends to and addresses the different social forces and cultural differences in the COUNSELING venue. Offered annually. Equivalent to COUN-516.

*3 semester hours*

COUNSELING 546

### **Social Psychology of Mental Health**

In this course, students will be introduced to fundamental concepts of social psychology as they relate to clinical and COUNSELING psychology theory and practice. Students will examine topics such as the role of social support (both perceived and actual) and how it can be applied in an intervention setting, the role of social cognition on topics such as stigma, defensiveness, and helping, and how to relate the role social psychology to clinical intervention and assessment.

*3 semester hours*

COUNSELING 552

### **Human Development: a Lifespan Approach**

This course provides a survey of major theories and issues in the field of human development. Topics include the nature of human development; research methods in the field of human development; biological bases for human development; the social, emotional and cognitive changes that occur across the lifespan; and how human development affects, and is affected by, family life, peer relationships, schooling, gender, values, and culture.

*3 semester hours*

COUNSELING 555

### **Student Development Theory**

This course is designed for graduate students in College Student Personnel. Course partici-

pants will conceptualize how college students grow and develop during the critical college years, become familiar with the major families of theories for understanding college student development and the concerns of students who are members of campus subculture, and be able to apply developmental theories in practical settings in higher education to assess problems encountered by college students and to design educational interventions.

*3 semester hours*

COUNSELING 562

### **Today's College Student**

This course will examine the diverse demographics of students of American colleges and universities, including international college students and discuss management of this culture. Students will research the literature on how college impacts students who attend as well as current trends and topics in higher education.

*3 semester hours*

COUNSELING 568

### **The Counselor As Professional**

This course serves as an orientation to the helping profession by addressing issues that impact on the provision of services such as ethics, law, certification, and professional role expectations. Completion of this course must precede internship. Offered annually. Equivalent to COUN-510

*3 semester hours*

COUNSELING 570

### **Strategies and Techniques of Counseling**

Building on basic listening skills this course focuses on developing strategies and interventions that promote therapeutic movement for the client. Techniques of the various theoretical orientations will be presented and practiced. Simulated role plays and videotaped sessions provide active opportunities to develop the skills. This course has significant out of class expectations. Prerequisites include completion of at least 9 credits and COUNSELING 505 and COUNSELING 512.

*4 semester hours*

COUNSELING 575

### **Practicum**

This course provides students an opportunity for supervised work experiences in a supervised work setting. Students participate in an exploratory field experience in selected community, agency, collegiate, or corporate settings. Departmental permission is required. Specific coursework may also be required depending upon concentration or setting.

*2 semester hours*

# Counseling

COUNSELING 582

## **Appraisal Procedures for Counselors**

In this course students become familiar with a variety of standardized assessment instruments, learn how to evaluate them, select several tests that are appropriate for use in an area of professional responsibility related to a real or anticipated COUNSELING situation, and interpret test results in a supervised setting. Prerequisites include COUNSELING 505, 508 and 610.

*3 semester hours*

COUNSELING 585

## **Trauma**

This course serves as an introduction to the counselor of the implications of the psychological trauma. Prevalence and impact will be explored as well as various treatment approaches. Minimum prerequisites: COUNSELING 505 and COUNSELING 523, Practicum Level, Post-Graduate or current Employment in the COUNSELING field preferred.

*3 semester hours*

COUNSELING 587

## **Psychopharmacology**

This course is designed to give community counselors a working knowledge of current trends in Psychopharmacology for children and adults. The increased use of medications to treat mental health disorders in our society has led to a need for mental health workers to understand the types of medications currently used, the effects of specific treatments, and the overall impact on educational, social & personal development. Prerequisites: COUNSELING 505 and COUNSELING 512.

*3 semester hours*

COUNSELING 588

## **Selected Topics in Behavioral Medicine**

Behavioral medicine is the clinical application of health psychology. This class will cover a range of topics that in health psychology that are most relevant to the practice of counseling. Students will explore the Clinical Mental Health applications of the nature of well-being, positive health behaviors, health risk behaviors and COUNSELING clients with chronic disease.

*3 semester hours*

COUNSELING 590

## **Master's Project**

This course is designed to assist the student in development of a scholarly master project, which is the final product required for completion of the Master's Degree in Counseling.

*1-3 semester hours*

*Project/Thesis Fee Assessed*

COUNSELING 591

## **Project Extension**

*1 semester hour*

COUNSELING 592

## **Cumulative Exam in College Student Personnel**

This course provides the culminating experience for students in the College Student Personnel Concentration of the Master of Science in Counseling. Students will take this exam after completing the core classes and must pass the class/exam (Graded S/U) in order to graduate.

COUNSELING 593

## **CPCE Exam**

This course will allow students to register for the CPCE, which they are required to pass as part of their degree plan. They currently petition to take the test and the department records if they pass. This is a more official way of recording test taking and passing.

COUNSELING 595

## **Addictions and Treatment**

This course is designed to provide a practical experience for counselors learning to work with alcohol and other drug abusers and other addictions. Covered in the course will be a survey of the various psychoactive drugs and behavioral addictions along with diagnosis and treatment modalities in working with persons with addictions, and those affected by persons with addictions. Prerequisites include Counseling: 505, 512 and 540.

*3 semester hours*

COUNSELING 599

## **Independent Study**

*3 semester hours*

COUNSELING 600

## **CMHC Internship I**

The goal of the internship is to further develop and refine the skills established during practicum. You are eligible for the internship component of your program after completing the required coursework and approval from faculty. The internship is the heart of the master's degree training program in COUNSELING at the University of Bridgeport (UB). It provides a venue within which students receive the guidance necessary for development as an entry-level counselor. Program faculties provide didactic and experiential training, which serves as the foundation for the development of skills necessary for independent work in clinical settings. Fee Assessed.

*1-4 semester hours*

COUNSELING 601

## **Internship 1 College Student Personnel**

The goal of the internship is to further develop and refine the skills established during practicum. You are eligible for the internship component of your program after completing the required coursework and approval from faculty. The internship is the heart of the master's degree training program in COUNSELING at the University of Bridgeport (UB). It provides a venue within which students receive the guidance necessary for development as an entry-level counselor. Program faculties provide didactic and experiential training, which serves as the foundation for the development of skills necessary for independent work in clinical settings. Fee Assessed.

*1-3 semester hours*

COUNSELING 605

## **CMHC Internship 2**

Clinical Mental Health COUNSELING Internship 2 Program faculties provide didactic and experiential training, which serves as the foundation for the development of skills necessary for independent work in clinical settings. This reflects on the second part of the internship experience and can only be taken after successful completion of COUNSELING 600. Permission of Instructor/Internship Coordinator Required. Offered in the fall and spring semesters. Prerequisite: COUNSELING 600.

*4 semester hours*

COUNSELING 606

## **College Student Personnel - Internship 2**

Prerequisite: COUNSELING 601.

*3 semester hours*

COUNSELING 607

## **Human Services – Internship 2**

Prerequisite: COUNSELING 602.

*3 semester hours*

COUNSELING 610

## **Career & Lifestyle Development**

This course provides an introduction to a lifespan approach to career and lifestyle development. Theories, research, and COUNSELING strategies related to career and lifestyle issues are explored. Labor resources and information, career assessment tools, computer assisted career guidance, life roles, cultural considerations, and placement procedures are reviewed as interrelated factors to the study of career development. Prerequisites: COUNSELING 505 and COUNSELING 512.

*3 semester hours*

## Counseling • Criminal Justice and Human Security

COUNSELING 615

### **Ethical and Legal Issues in Higher Ed**

This course is designed to provide entry-level student affairs practitioners a basic understanding of the legal issues prevalent on college campuses. Students will study case law and apply their knowledge through case studies.

*3 semester hours*

COUNSELING 670

### **Family Counseling**

This course examines the history of family counseling, the stages of family development, philosophical basis and major theoretical approaches to family counseling. Ethical issues and guidelines specific to family COUNSELING in alignment with Ethical Standards of the American COUNSELING Association and the American Association for Marriage and Family Therapy will be discussed.

*3 semester hours*

COUNSELING 682

### **Cognitive Behavioral Therapy**

The course is designed to teach students the basics of how to conduct Cognitive Behavior Therapy (CBT). Lectures will stress theory and case conceptualization. Exercises will address both theory and application. This course provides a more sophisticated, in-depth look at CBT as it pertains to cases. Students will read two texts and case and/biographical material. They will also participate in in-class exercises that will include operationalizing the problem, case conceptualization, treatment planning, practicing specific techniques (in the roles of therapist and client), and considering special issues for certain populations. Prerequisites: COUNSELING 505 and COUNSELING 512.

*3 semester hours*

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## **Criminal Justice and Human Security**

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CRIMINAL JUSTICE AND HUMAN SECURITY 501

### **Criminal Justice Research Methods**

CJHS 501 Criminal Justice Research Methods is a Core course required for the Master's degree in CJHS. This course analyzes research strategies and methods for research in criminal justice and human security. It provides a detailed review of quantitative and qualitative methods, including record reviews, official data, subject surveys, and ethnographic interviews and participant observation. It focuses on the links between theories and methods, research design, sampling, measurement, data collection, and

ethical concerns of protecting human subjects. Students are required to write a research proposal, including objectives, background and methodology.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 511

### **Human Security and Approaches to Justice**

CJHS 511 Human Security and Approaches to Justice is a required core course for the MA in Criminal Justice and Human Security. This course is primarily designed to familiarize students conceptually and substantively with history, concepts, legal documents, and global policy processes related to human rights, humanitarian affairs, international peace and security, and other aspects of human security. Emphasis will be placed on the use of legal means, and in conjunction with national and international criminal justice systems. Writing assignments will be designed to develop the ability to communicate cutting-edge human-security related research outside academic circles. Students will also be encouraged to think about how to develop research designs in important areas of human security and justice.

*3 credits*

GLDP 522/CRIMINAL JUSTICE AND HUMAN SECURITY 522

### **International Conflict and Negotiation**

This course examines theories about and sources of conflict (resource allocation and shortage; ideological, religious, and cultural disagreement; power distribution; perceptions of security; etc) to set the stage for conflict analysis and negotiation. In conflict analysis, the impact of cultural-linguistic systems on agreements and disagreements is examined. Culturally sensitive strategies of negotiation, conflict resolution, and mediation also are examined and practiced. Students will write several case reports on situations of conflict and also prepare a medium-length (20 pp. or so) term paper.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 530

### **U.S. Law and Criminal Justice**

CJHS 530 U.S. Law and Criminal Justice is a required core course for the MA in Criminal Justice and Human Security. The course examines the interrelationships between law, crime, and public policy. Constitutional law affecting the criminal justice system will be surveyed from the perspectives of both legal principles and public policy. Students will research in-depth a relevant issue in constitutional law.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 532

### **Law Enforcement Management**

This course invites graduates to understand and anticipate the challenges faced by those who have assumed leadership roles within law enforcement agencies. The course takes into consideration leadership styles, approaches to management, decision-making methodologies, dispute resolution, multicultural management, crisis management and interpersonal communication.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 535

### **Theories on Crime, Norms and Deviance**

CJHS 530 Theories on Norms and Deviance is an elective course for the Masters in CJHS. This course discusses the major theories of norms, deviance, and criminal behavior across major cultural spheres and history.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 540

### **International Criminal Law**

CJHS 540 International Criminal Law Human Security and Approaches to Justice is an elective course for the MA in Criminal Justice and Human Security. This course is designed to familiarize students with the history and practice of international criminal law, from the groundbreaking post-World War II tribunals of Nuremberg and Tokyo, the ad hoc tribunals, and the International Criminal Court. General principles and specific rules of law will be examined, with a particular emphasis on the linkage between law and policy objectives. Writing assignments will be designed to develop legal reasoning and argument, as well as articulate policy goals. Students will also be encouraged to think about how to develop research designs in the field of international criminal law.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 550

### **Comparative Criminal Procedure**

CJHS 550 Comparative Criminal Procedure is an elective course for the MA in Criminal Justice and Human Security. The course has four main sections. First, we begin by reviewing how criminal procedure relates to desired standards of democracy and the rule of law. Taking a topic approach organized according to the chronological phases of the criminal process, we examine five distinct stages of this process: (1) investigation, (2) arrest, search, and seizure, and (3) interrogation, (4) pre-trial court procedures, and (5) the trial itself. In each phase, students first examine criminal procedure principles and practices in the U.S.,

## Dental Hygiene • Dental Hygiene

and then examine these principles and practices in 12 other countries, including England, France, Germany, and Italy from Europe; Russia (exemplifying the post-Soviet world), Israel (illustrating a “security state”), Egypt and South Africa representing Africa, and Argentina and Mexico representing Latin America. Third, we turn our attention to reform movements abroad, with particular attention to the Iberian Peninsula (Spain) and Latin America, including recent reforms in Chile and ongoing reforms in Colombia and Mexico. This section highlights the origins of these reform movements and the assessment of the effects of reform. Finally, drawing on the insights gathered from the comparative analysis above, we return to the U.S. to examine how best practices identified elsewhere compare with current practices here at home.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 559

### **Cybercrime and Cyberterrorism**

CJHS 559 Cybercrime and Cyberterrorism is a course elective for the Masters degree in CJHS. The purpose of this course is to introduce students with the technical, social and legal aspects of cybercrime and cyber terrorism. This course examines the criminal activity that occurs in cyber space, the criminal actors that operate in this space, and how policing and government bodies are managing these crimes and criminals. Finally, the course will take the student into areas where terrorists would try to use the Internet in more threatening ways as a weapon against society.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 560

### **Transnational Crime-Drugs, Human Trafficking, Arms Shipment**

CJHS 560 Transnational Crime-Drugs, Human Trafficking, Arms Shipment is a course elective for the Masters degree in CJHS. This course is an examination of two transnational criminal enterprises, the smuggling of drugs and weapons, and trafficking of persons that draw on similar criminal groups methods, and motives. It covers analytic approaches to studying the topics; the role of organized and other forms of crime to each; how agents operate in specific geographic contexts; and how state and non-state actors are responding to the smuggling and trafficking of persons. The class examines the rise of the phenomenon, the role of conflicts in illicit trade and the actors who facilitate this trade and the policies that are needed to address it.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 578

### **Topics in Criminal Justice Policy**

CJHS 578 Topics in Criminal Justice Policy in a course elective for the Masters degree in CJHS. This course is designed to provide students a broad overview of criminal justice policies, both domestic and comparative. It examines the goals and values underlying justice policy, the social construction of crime problems and the process of policy development. Includes readings and discussion on: law and justice policy in a federal system; crime prevention and institutional responses to crime; emerging cross-national issues in crime, law, and policy.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 591

### **Internship**

The Graduate Internship is completed once the student has completed 18 credits in the CJHS MA program. It serves as the venue in which students can gain valuable work experience in the field of Criminal Justice and Human Security. It also gives students the opportunity to utilize the theories and ideas learned in CJHS courses.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 598

### **Tutorial**

The Tutorial is offered at the completion of the internship for students in the Master of Arts in Criminal Justice and Human Security program. As part of the Tutorial, students write, reflect and present on their internship experience and its relationship with the theoretical underpinnings of their program of study. The student in this class is also invited to reflect on herself/himself and identify interests, aspirations, personal strengths, and areas needing more work. This requires an assessment of one's skillset or toolbox for navigating life's challenges. Students will assemble a portfolio of all of the significant work that they have completed during the Master's program and reflect on that work as they prepare for the next career steps. The tutorial also serves as the venue for the program's comprehensive exam that includes both an oral and a written component. Prerequisite: CJHS 591 and completion of at least 21 semester hours in the CJHS program.

*3 credits*

CRIMINAL JUSTICE AND HUMAN SECURITY 599

### **Thesis or Project Demonstrating Competence**

The thesis represents the culmination of the MA in Criminal Justice and Human Security class. It demonstrates competency in the major as well as the track in which the student has chosen to specialize. The Thesis requires identifying

a theme or topic selected by the student in consultation with the thesis adviser and this is followed by detailed research on the topic and the analysis of findings in the form of substantial written work. This is normally done within the confines of the student's final semester of study in the program. Students also have the option of a project demonstrating competency (PDC), which includes key papers from the student's graduate study. In creating a PDC, students' papers must be revised and refined to reflect thesis-level work. They should be contextualized through a separate detailed text that includes a literature review and explains both the significance of previous papers in the PDC and the ways in which they correlate.

*3 credits*

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## Dental Hygiene

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DENTAL HYGIENE 500

### **Leadership in Dental Hygiene**

This course focuses on the theories, concepts, and principles of leadership skills related to personal behavior, communication, organizational and leadership styles. This course explores the opportunity to develop leadership roles appropriate to the dental hygiene profession.

*3 lecture hours, 3 semester credits*

DENTAL HYGIENE 501

### **Grant and Contract Writing**

This course will provide the graduate students with an introduction to the process of grant application, award, post award management, types of grants and contracts, content and language of announcements for funding, and requirements of various funding agencies. The steps to writing a grant proposal for healthcare funding from private, state, and federal funding sources will be covered.

DENTAL HYGIENE 502

### **Evidence Based Research**

This course is designed to prepare the student to utilize research as the foundation for clinical decision making. The practical application of evidence-based decision making to the clinical management of individual patients is explored.

*3 lecture hours, 3 semester credits*

DENTAL HYGIENE 503

### **Clinical and Didactic Educational Concepts**

This course will introduce the graduate student to a procedure for developing a competency-based curriculum. The student will learn the steps in developing a lecture, module of instruction, and a course. Cognitive, affective, and psychomotor learning theories are

## Dental Hygiene • Design Management

addressed along with clinical teaching methodologies.

*3 lecture hours, 3 semester credits*

DENTAL HYGIENE 504

### **Dental Hygiene Student Teaching**

This course will provide students with the practical knowledge and skills to function as a competent clinical/laboratory/didactic instructor. Psychomotor skill development and analysis, remediation of performance concerns, evaluation, and faculty calibration are areas stressed.

*1 lecture hour, 4 clinic/laboratory hours, 3 semester credits*

DENTAL HYGIENE 506

### **Global Healthcare**

This course will introduce health care systems and discuss the contexts in which they develop and function. Specific attention will be paid to the developmental history, financing and delivery infrastructure. The changing U.S. healthcare system will be discussed as will the approaches used in other countries to manage and organize health care. The impact of global health and disease, social determinants of health and future challenges and opportunities for healthcare systems will be examined.

*3 lecture hours, 3 semester credits*

DENTAL HYGIENE 507

### **Dental Health Services Administration/Management**

This course is designed to familiarize the student with the administrative concepts necessary to effectively administer dental health facilities and departments. Emphasis is placed on leadership, decision making and problem solving skills. It examines political, social, and legal systems that affect dental hygiene administration and influence its role.

*3 lecture hours, 3 semester credits*

DENTAL HYGIENE 508

### **Curriculum Development and Management**

This course provides the student with the study and development of models for dental hygiene curriculum design and implementation. The development and utilization of competencies and the evidence based instruction is emphasized.

*3 lecture hours, 3 semester credits*

DENTAL HYGIENE 510

### **Foundations of Healthcare Management**

The focus of this course is the healthcare system in the U.S., specifically how its entities work, how they interrelate and how it differs from healthcare systems in other countries with more government controlled systems.

DENTAL HYGIENE 511

### **Epidemiology**

This course will provide the graduate student with the skills necessary to study health states in populations and its applications in basic science, general clinical research, and public health. Students will critique the dental hygiene literature as it applies to the subject of epidemiology.

*3 semester credits*

DENTAL HYGIENE 512

### **Dental Public Health**

This course is designed to prepare students for leadership roles in public health settings. The graduate student will learn the skills necessary to study health states in populations and its applications in basic science, general clinical research, and public health. Emphasis is placed on administration, consumer advocacy, epidemiology, the assessment, planning, implementation, and evaluation stages of programs, and expanded and alternative dental hygiene care.

*3 lecture hours, 3 semester credits*

DENTAL HYGIENE 513

### **Contemporary Issues in Dental Hygiene**

This course will explore current concepts and challenges facing dental healthcare delivery through the development of collaborations across healthcare disciplines, delivering culturally and linguistically competent healthcare, and evaluating current and proposed dental healthcare workforce models. Initiatives serving the purpose of guiding national health promotion and disease prevention to improve the dental health of the U.S. Population and informing the american public on health matters will be examined.

DENTAL HYGIENE 515

### **Statistical Reasoning**

This course will provide a basic overview of statistical analysis and how certain tests can be performed to determine if there is a statistically significant relationship between variables. The student will receive an introduction to the use of statistical software for data analysis.

*3 semester credits*

DENTAL HYGIENE 516

### **Concentrated Practicum**

This course provides the Graduate student with the opportunity to take an active role in the development of a practical experience at a site relevant to their specialized area of concentration. The student identifies a site and mentor to supervise the practicum prior to the start of the course. The practicum faculty advi-

sor works closely with the student throughout the course providing strategies to help the student achieve a successful outcome.

*1 lecture hour, 6 laboratory/clinic hours, 3 semester credits*

DENTAL HYGIENE 520

### **Dental Hygiene Capstone**

Original research in a chosen topic relating to the graduate student's area of specialization will be studied, conducted, written and presented.

*1 lecture hour, 6 laboratory/clinic hours, 3 semester credits*

DENTAL HYGIENE 521

### **Dental Hygiene Capstone Extension**

*1 credit*

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## Design Management

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DESIGN MANAGEMENT 400

### **Collaborative Design Studio I**

Design Management is an inter-disciplinary field that combines various forms of design including graphic design and branding, interior design and architecture, industrial design, and fashion and textile design. Collaborative Design Studio I will begin to equip students with the skills they need to work with cross-functional teams. This is done through client-based design projects that originate from local Fortune 500 and other global organizations. Students will learn communication, team building, and leadership skills as they hone their design talents.

*2 semester credits*

DESIGN MANAGEMENT 401

### **Collaborative Design Studio II**

Building on the foundation formed in Collaborative Design Studio I, students will again be grouped in inter-disciplinary teams to complete an innovative, client-based design project. The projects for this course will focus the students' attention on the triple bottom line: profitability, sustainability, and responsibility.

*2 semester credits*

DESIGN MANAGEMENT 500

### **Collaborative Design Studio III**

Collaborative Design Studio III will continue to equip students with the skills they need to work with cross-functional teams on real world, client-based assignments. Students will learn communication, team building, and leadership skills as they hone their design talents.

*2 semester credits*

DESIGN MANAGEMENT 501

# Design Management

## **Collaborative Design Studio IV**

Collaborative Design Studio IV will continue to equip students with the skills they need to work with cross-functional teams on real world, client-based assignments. Leadership skills will be given extra attention during the second year's teamwork.

*2 semester credits*

### DESIGN MANAGEMENT 410

#### **Design Management I**

Design Management is a multifaceted, organic discipline whose exact definition can differ between organizations and Design Managers. In Design Management I, students will explore various definitions of Design Management with the goal of defining their own course of study. By reading and writing about relevant case studies, students will examine a wide variety of applications of design management. Students will be required to present their description of design management by the end of the term.

*3 semester credits*

### DESIGN MANAGEMENT 411

#### **Design Management II**

As the student's concept of design management deepens, they will begin to explore the implications that design management has on an organization. Design Management II will describe the six core principles of the program: Marketing, Leadership, Finance, Legal, Operations, and Strategy, as well as the triple bottom line: Profitability, Responsibility, and Sustainability. Students will learn the ripple effect their design decisions have on an organization as they broaden their understanding of the field of design management.

*3 semester credits*

### DESIGN MANAGEMENT 510

#### **Design Management III**

Students will continue to further their understanding of design management. Through relevant case studies, text readings, and lectures, students will develop a plan for the application of design management principles within their organization. The final project for this class includes an action plan for an organization where design management principles will make a meaningful impact on their triple bottom line.

*3 semester credits*

### DESIGN MANAGEMENT 511

#### **Design Management/Thesis IV**

Design Management/Thesis IV requires students to develop an idea that embraces and explores a particular aspect of design manage-

ment. Students will work independently on a paper that broadens the design management field. This unique challenge demands that the students demonstrate an understanding of the six core principles of the program: Marketing, Leadership, Finance, Legal, Operations, and Strategy, while injecting their own interpretation of design management based on their experience, talent, and culture.

*3 semester credits*

### DESIGN MANAGEMENT 598

#### **Internship/Co-op**

Fairfield County and the surrounding tri-state area are rich in organizations in need of qualified design management interns. Through strategic partnerships and student initiative, internships will be established to give students first-hand experience as a design manager. Students will report on their experience and that report, coupled with his or her manager's evaluation, will form the basis for determining the student's grade. Internships are taken by domestic students; Co-ops are taken by international students.

*1-3 semester credit*

### DESIGN MANAGEMENT 599

#### **Special Projects**

Special projects and independent study give students the opportunity to explore specifics of design management as they relate to their own area of expertise. Students will be encouraged to seek out opportunities to gain practical experience in the design and design management fields. This course should include field, library, and institutional research on a specific aspect of design management. Student evaluation will be based on a report submitted by the student.

*2 semester credits*

### MARKETING 400

#### **Marketing**

This course explores the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual, organizational, and societal objectives. The underpinnings of marketing discipline will be taught through text, case studies, articles, and class discussion. Mastery of these principles will come through individual and group assignments to create marketing solutions for real-world products.

*3 semester credits*

### MANAGEMENT 400

#### **Leadership & Management**

This course will introduce students to the

primary tenets of leadership and management. Successful organizations foster innovation and efficiency. Students will evaluate the dynamics related to realizing organizational progress through the effective and efficient use of talent, structure, culture, methods, and technology. In addition to the required textbooks, students will research industry journals as a way to evaluate the application of leadership and management techniques in real settings across various industries.

*3 semester credits*

### ACCOUNTING 400

#### **Financial Accounting**

This course will provide managers with the skills necessary to read, interpret, and apply information about an organization's financial position. Managerial accounting and finance concepts will precede financial statement analysis. Topics covered include: how accounting data is generated in business operations, how financial statements are created, management of finance to maximize return on investment, and stakeholder equity. Students will participate in case work applying the principles presented in class.

*3 semester credits*

### BUSINESS LAW 400

#### **Legal Environment of Business & Ethics**

This course focuses on how the legal environment of business impacts business decisions with broad ethical, international, and critical thinking examples throughout. Knowledge of the legal aspects of running a business will enable the student to conduct business within the legal framework and understand the ethical dimension of business decisions. Topics include: Introduction to Business Ethics and the Judicial and Legislative Process; Litigation, Alternative Dispute Resolution, and the Administrative Process; Business Crimes, Torts, and Contracts; The Constitution and Government Regulation of Business; Business Organizations; Employment and Labor Laws; Consumer Protection and Environmental Regulation; and International Law and Ethical Conflicts.

*3 semester credits*

### INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT 400

#### **Information Systems & Technology**

Information technology has become a key component for accomplishing strategic and operational goals in organizations today. As such, organizations expect their new employees to have a basic understanding of information technologies. To accomplish organizational goals and advance one's career path, one needs to understand and apply in-

## Design Management • East Asian and Pacific Rim Studies

formation technologies effectively, efficiently, and creatively. The purpose of this course is to provide an introduction to information systems and technology and to familiarize students with the fundamental concepts and principles of information systems. The course is targeted for graduate students who have little or no background in information systems. Therefore, it focuses on breadth of coverage rather than depth in any specific area.

*3 semester credits*

MANAGEMENT 582

### **Small Business & Entrepreneurship**

A comprehensive review of the marketing, operational, financial, product, service, and business strategy and plans that must be mastered and developed as foundation for start-up of a small business or entrepreneurial enterprise. In addition, growth of existing business through intrapreneurship is also covered. Students will develop a comprehensive business plan for a business of their choice which is acceptable to the professor.

*3 semester credits*

DESIGN MANAGEMENT 580

### **New Product Commercialization**

The objectives of this course are to understand and apply concepts and techniques of product commercialization. The course focuses on taking student-created product concepts and having student teams drive the concepts to become actual products. Product design, prototype creation, market analysis, and financial analysis all come together with the student team to create a viable product. If ideas are worthy, teams may work with the University's CTech IncUBator to actually commercialize their products. Students are strongly encouraged to find a sponsor to actually commercialize their product ideas.

*3 semester credits*

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## **East Asian and Pacific Rim Studies**

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GLDP/EAST ASIAN AND PACIFIC RIM STUDIES 401/501

### **Graduate Seminar in Research Methods**

This is an introductory course in qualitative and quantitative research methods. It is designed to introduce you to basic concepts and issues (statistical, analytical, and ethical) encountered in research investigation. We will discuss what research is, the tools of research, research design, and writing the research report. Included will be an introduction to a diversity of research methods, including survey, historical research,

experimental methods, content analysis, and so forth. An overview of statistical means of data interpretation also will be presented, including correlation, t-tests, ANOVA, Chi-Square Test, Sign Test, regression analysis, and so forth.

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 500

### **Graduate Co-op/Internship in East Asian and Pacific Rim Studies**

Students may complete a curricular practical training that reflects the competencies that the students has developed in the East Asian and Pacific Rim Studies program. Students need to have their supervisor in the training certify satisfactory task performance and students must submit a written evaluation of their experience.

*1-3 semester hours*

GLDP/EAST ASIAN AND PACIFIC RIM STUDIES 522

### **Conflict Analysis and Resolution**

This course examines theories about and sources of conflict (resource allocation and shortage; ideological, religious, and cultural disagreement; power distribution; perceptions of security; etc) to set the stage for conflict analysis and negotiation. In conflict analysis, the impact of cultural-linguistic systems on agreements and disagreements is examined. Culturally sensitive strategies of negotiation, conflict resolution, and mediation also are examined and practiced.

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 525

### **Models of Good Governance in the Asia-Pacific**

This course examines the philosophical and the political underpinnings of good governance of the Asia-Pacific region. This course will taken into account the two major reference points for political philosophy in the region- Western Political Philosophy and East Asian political philosophy with special attention being given to Confucianism. Students will also consider the role of Islam and its political implications with particular attention being paid to Indonesia, Malaysia and the Moros regions of the Philippines. The course will also note the unique process of transition from authoritarian to democratic rule in Japan, Korea, Taiwan, and in the Peoples Republic of China.

*3 semester hours*

GLDP/EAST ASIAN AND PACIFIC RIM STUDIES 528

### **Sociopolitical Implications of World Religions**

This course identifies the underlying conditions needed for the realization of a stable global economy and it highlights the ways in which terrorism impacts on the stability of markets and on investment and lending trends and on interest rates in affected regions and stages.

The course also explores the practical rationale for terrorism as well as terrorism's ideological and philosophical roots as well as the actual historical trajectory of terrorist organization and states. Through the case study method, we will review those venues where terrorism has been diffused and attempt to understand such developments and their applications to contemporary society.

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 530

### **Pacific Rim Culture and Development**

This course introduces students to the challenges of socioeconomic and political development in the Pacific Rim with its sharply differing approaches to development, due to factors such as traditions, which have existed in some cases for millennia and are also influenced sharply by histories of Eastern and Western colonialism and cross-cultural differences. The course introduces students to the modern models of developments which have been employed by the United States, Australia, China, Singapore, Chile, Japan, Taiwan, and Korea and will consider the lessons learned from these processes. The course will also explore the major religious and cultural trends as well as some of the historical developments that have contributed to recent East Asian economic successes.

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 533

### **Chinese Foreign & Economic Policy**

The rise of China provides both opportunity and a challenge to the world, especially its Belt and Road Initiatives, the Asian Infrastructure Investment Bank and other strategic and economic policies.

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 524

### **Political and Economic Integration**

The course will consider the unique challenges that have slowed efforts to create an East Asian and eventually an Asia Pacific Economic Community. Students will dedicate special attention to the creation and development of the Asia Pacific Economic Cooperation and to the issue of political and economic hegemony and the ongoing disputes related to territorial disputes and interpretations of history. Students will also be introduced to the legal instruments and treaties that facilitated European integration as a possible measure or eventual standard of successful integration.

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 563

## East Asian and Pacific Rim Studies • Economics • Education

### **Business and Diplomacy—East Asia vs. the West**

This course will consider the differing approaches to business and diplomacy of East Asia and the West. It will consider the ways in which the two approaches differ from each other, considering elements such as “face,” direct versus indirect approaches, and the primacy of relationship versus the primacy of legal contracts. The course will be conducted based on a series of case studies and simulations where students will be asked to plan and participate in intercultural negotiations and planning.

*3 Semester Hours*

GLDP/EAST ASIAN AND PACIFIC RIM STUDIES 591

### **Internship**

The Graduate Internship is completed once the student has completed at 21 credits in the GLDP program. It serves as the venue in which students can accomplish two important outcomes, i.e., they can apply the foreign language that they have been studying in an overseas setting (international GLDP students may do their internship in the US if they already speak a second world language in their home country rather than English) and they can intern in an agency or organization where the skills that they have acquired in the GLDP academic program can be put into practice.

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 598

### **Tutorial**

The tutorial is offered at the completion of the internship of students in the Master of Arts in Global Development and Peace. The Tutorial is designed to allow students to reflect on and present on the internship experience. The tutorial invites students to reflect on the internship experience based on the student's experiences prior to and during the tutorial as well as a broader reflection on the mission of and lessons learned from the organization where the student has interned. The tutorial also prepares students for the program's comprehensive exam that includes both an oral and a written component. As a part of the tutorial students also assemble a portfolio of all of the significant work that they have completed during the program and a written reflection on that work. Much of the work of the tutorial is done independently of the classroom experience. Students are welcome to meet with the instructor as they progress in

preparations and they are strongly encouraged to do so. (Prerequisites: Student must have completed 24 credits in the program including the internship).

*3 semester hours*

EAST ASIAN AND PACIFIC RIM STUDIES 599

### **Thesis**

The thesis represents the culmination of the MA in East Asian and Pacific Rim Studies demonstrates competency in the major as well as the track in which the student has chosen to specialize. The Thesis requires identifying a theme or topic selected by the student in consultation with the thesis adviser and this is followed by detailed research on the topic and the analysis of findings in the form of substantial written work. This is normally done within the confines of the student's final semester of study in the program.

*3 semester hours*

## **Economics**

ECONOMICS 400

### **Economics**

This is a course for managers in both micro and macro economics. Topics addressed will include the prevailing patterns of economic institutions, national income analysis, international trade, prices and production; economic development, market structure and consumer decision analysis, competition, monopoly and monetary policy issues. Prerequisites: Admission to graduate study.

*3 semester credits*

ECONOMICS 500

### **Economics & Finance**

This course is a graduate introduction to the study of economics and finance, two interrelated and integral fields in the study of business. This course develops the foundation in understanding how the real economy works, and how finance connects the real economy to the monetary system via the financial system. The course starts by discussing how the market system works, including basic macroeconomic concepts relevant to the study of finance. Subsequently, the course delves into how capital budgeting decisions made by firms are essential to achieve macroeconomic goals. Topics include financial statements, time value of money, the financial markets, and how firms make capital budgeting decisions.

In addition to textbook readings, students will use current events to complete.

*3 semester credits*

## **Education**

*Note: Teacher Leadership courses are designated with the prefix of EDMM. Specific titles are listed with the programs of study in the chapter for graduate studies in the School of Education. Consult the division faculty for detailed course descriptions.*

EDUCATION 348 C, M

### **Directed Observation and Supervised Teaching in the Elementary or Middle School**

This is a full-time field experience in a selected elementary or middle school. This meets requirements of Connecticut's TEAM program. Department permission is required.

*6 semester hours*

EDUCATION 392

### **Directed Observation and Supervised Teaching in Secondary Schools**

This is a field experience in selected secondary schools. This meets requirements of Connecticut's TEAM program. Departmental permission is required. Department permission is required.

*6 semester hours*

EDUCATION 440

### **Methods and Materials in Teaching Language Arts**

This course focuses on the teaching and learning of the English language arts with an emphasis on instructional planning and assessment using current state and national standards.

ED 440C concentrates on the language arts processes and practices implemented in the elementary-level curriculum, grades K-6.

*2 semester hours*

ED 440M concentrates on the language arts processes and practices for middle school settings, grades 4-8, with an emphasis on interdisciplinary connections.

*3 semester hours*

ED 440J concentrates on the issues and pedagogy of teaching the English language arts and literature in secondary-level settings, grades 7-12.

*3 semester hours*

EDUCATION 441

### **Methods and Materials in Teaching Mathematics**

This course deals with methods of teaching mathematics. Materials are examined for their use in diagnosis, remediation and enrichment,

## Education

as well as emphasizing planning and instruction using current state and national standards.

ED 441C concentrates on the scope and sequence, as well as appropriate activities, for the elementary level.

ED 441M concentrates on the appropriate practices for middle school, grades 4-8, with an emphasis upon interdisciplinary connections.

ED 441J concentrates on the content and methodology of mathematics for secondary students.

ED 441C — 2 semester hours

ED 442M, J — 3 semester hours

EDUCATION 442

### **Methods and Materials in Teaching Social Studies**

This course assists students in developing competencies in unit planning, instructional strategies, and the utilization of diverse materials and technology for teaching the social studies. Students design courses of study that integrate state and national standards; contemporary thinking about the teaching of social studies is stressed.

ED 442C concentrates on the activities, planning, and materials for social studies in elementary classrooms.

ED 442M concentrates on the content, practices, and planning appropriate for the middle level, grades 4-8. Interdisciplinary possibilities are examined.

ED 442J concentrates upon appropriate content, planning, and practices for 7-12 classrooms.

ED 442C — 2 semester hours

ED 442M, J — 3 semester hours

EDUCATION 443

### **Methods and Materials in Teaching Science**

This course introduces teaching approaches, instructional materials, and contemporary thinking about science education, as well as emphasizing planning and instruction using current state and national standards.

ED 443C concentrates upon the practices and materials of effective science for elementary level.

ED 443M concentrates upon the appropriate content and practices for the middle grades, 4-8. Interdisciplinary possibilities are examined.

ED 443J concentrates upon the appropriate content and practices for the secondary science curriculum.

ED 443C — 2 semester hours

ED 443M, J — 3 semester hours

EDUCATION 446

### **Methods and Materials in Teaching a World Language**

This course familiarizes the student with the major purposes of the study of world language in the schools. It introduces the strategies and classroom activities for effective teaching. It examines appropriate materials for teaching world languages.

3 semester hours

EDUCATION 447

### **Methods and Materials of Teaching English as an Additional Language**

This course explores the language needs of children who are learning English as an additional language. It reviews and explains effective methods and strategies for teaching such students. The most appropriate materials are identified and utilized.

3 semester hours

EDUCATION 450

### **Field Experience**

This course is a structured observation in a private or public school. The goals of the course are to facilitate the candidate's awareness of self, of school pupils, and of prospective teachers. The course is an elective for other majors. The number of semester hours taken should be determined with the student's advisor. Two semesters of field experience are required a total of (6 credit hours); 3 credit hours each semester.

1-6 semester hours

EDUCATION 500

### **Research Techniques and Report Writing**

This is an introduction to the research process, to the understanding of published research, and to the application of research findings to education. The course prepares the student to write formal papers and research reports.

3 semester hours

EDUCATION 503

### **Diverse Students: Differentiated Instruction**

This course focuses on pedagogy based on the philosophy that each student is a unique learner and that instruction should be provided that meets the needs of diverse students. Methods for addressing the needs of students' diverse strengths, background, experiences, gender, linguistic, and learning styles will be presented. It is recommended that the course will be taken after completion of EDU 564: Education of Students with Exceptionalities.

3 semester hours

EDUCATION 505

### **Intercultural Relations: Teaching and Learning in Multicultural Environments**

This course presents an overview of theories about educational, social and cultural problems of minority culture students, about teacher perceptions and expectations, about parental involvement. The course also critically analyzes policies and practices of multicultural and bilingual education. The thrust of the course is to develop appropriate and non-biased methods of teaching all children.

3 semester hours

EDUCATION 509

### **Psychological Foundations in Education**

This is concerned with the work of educators in general and teachers in particular. Topics include student characteristics (personality, growth, and development, adjustment, etc.) motivation, learning, measurement and evaluation, objectives, and teaching methods.

3 semester hours

EDUCATION 511

### **Statutory Requirements**

This course addresses the topics required for Connecticut licensure in teaching, including topics in health and intergroup relations.

1 semester hour

EDUCATION 515

### **Clinical Experience—Internship Program**

In the first semester interns will work under supervision in a learning environment, providing a variety of paraprofessional services to the schools.

In the second semester the internship is designed to provide (1) a more in-depth perspective of teaching and learning through the development of a portfolio and (2) an opportunity to reflect on and document the impact of the internship experience.

6 semester hours

EDUCATION 536

### **Adolescent Literature**

This surveys books and periodicals emphasizing criteria for selection and evaluation, procedures for establishing a program of literature in the schools, and opportunities to explore the interpretation of literature in the classroom through drama, storytelling, book reporting, and choral speaking. Education 536C is focused on children's literature. Education 536J concentrates on adolescent literature. Education 536M concentrates on a pre-adolescent

## Education

literature.

EDUC 536C – 2 semester hours

EDUC 536M/J – 3 semester hours

EDUCATION 537

### **Middle Grades Interdisciplinary Teaching and Teams**

This course focuses on the developmental levels of the middle school student, appropriate instructional climates for middle grade classrooms, and interdisciplinary planning across subjects in English, History/Social Studies, Math, and Science.

*3 semester hours*

EDUCATION 540

### **American Culture and Education**

This course addresses cultural issues related to education. Topics include multicultural issues in America and the interpretation of demography in relation to schooling. The search for national identity and educational alternatives are explored.

*3 semester hours*

EDUCATION 541

### **Classroom Management in Teaching English as an Additional Language**

This course focuses on classroom management as an effective tool for a positive learning environment. Planning, implementing, and maintaining management procedures are discussed.

*2 semester hours*

EDUCATION 542

### **Theory and Methods of Teaching English as an Additional Language**

This course addresses the foundations of second language learning theory, research, and discourse in educational settings. It also focuses on strategies for teaching dual language instruction with emphasis on a culturally responsive environment and on legal issues as they apply to schooling for English language learners.

*3 semester hours*

EDUCATION 543

### **Second Language Acquisition**

This course provides an overview of the major theories of first and second language acquisition. It applies these theories to classroom pedagogy and examines the influences of parents, siblings, and peers, as well as aspects of formal and informal education. It also examines the influence of region, culture, class, and gender on language acquisition; legal and ethical issues relative to language competency are addressed.

*3 semester hours*

EDUCATION 545

### **English Language and Literature for Teachers**

The purpose of this course is to give prospective teachers of English as an additional Language (ESL) a rich knowledge of literature with potential classroom applications for multicultural settings. Selection and analysis of language processes and literature for elementary and secondary-level classrooms are included.

*3 semester hours*

EDUCATION 546

### **Linguistics for Teachers**

This course acquaints teachers with the major analytical frameworks in linguistics. It surveys the discipline of linguistics, the study of human languages, contrastive features, and language systems.

*3 semester hours*

EDUCATION 548

### **Evaluation of Instructional Outcomes**

This course gives students an orientation to the topics, issues, and concepts in the field of educational testing and measurement. Topics include methods for evaluating instructional programs, types of instruments for collecting data, and a variety of standardized, criterion-referenced, and performance-based assessments. The construction of teacher-made tests and the interpretation of different types of test scores are included.

*3 semester hours*

EDUCATION 560M

### **Human Growth and Development, Middle**

This course provides an opportunity for the study of the subject matter of human development, with a concentration upon the uniqueness of the adolescent period. Theoretical models and methods of researching human growth and development including cognition, physical, social, emotional and moral development will be studied. Genetic and environmental influences of human development will be discussed. Implications for classroom instruction in the middle grades will be explored.

*3 semester hours*

EDUCATION 564

### **Education of the Exceptional Student**

The focus of this course is placed upon the instructional methods and materials for exceptional students. General management techniques and administrative procedures are considered in light of the student's special needs in order to identify and work effectively with the major categories of exceptionality, includ-

ing the learning disabled, the handicapped, and the gifted, etc. Requirements of the 94-142 law are examined.

*3 semester hours*

EDUCATION 565

### **Contemporary Problems in Education I**

This is a study of foundations, issues and contemporary trends in education with their application to teaching in the schools. An effort will be made to encourage teachers to develop an understanding of their own philosophy of education and how it affects their teaching.

*3 semester hours*

EDUCATION 566

### **Contemporary Problems in Education II**

This independent study fulfills the Final Degree Option for the Master's degree. Students pursue an individually planned project under advisement of a faculty member. Extensive reading supports the project. May be taken as an extension of ED 500 or ED 565.

*3-6 semester hours*

EDUCATION 571

### **Diagnosis and Intervention of Reading and Language Arts Difficulties**

This course examines the range of problems that cause students difficulties in literacy processes. It examines assessment instruments and strategies for intervention and instruction in Reading and Language Arts.

*3 semester hours*

EDUCATION 572

### **Advanced Diagnosis of Reading and Language Arts Difficulties**

This course is for students interested in working with learners experiencing profound difficulty in reading, writing, and other literacy processes. Students learn strategies for assessing students referred for specific literacy instruction. Both individual and group diagnostic assessments are used. Students learn how to interpret testing results and make recommendations for improvement. Prerequisite: EDUC 571

*2 semester hours*

EDUCATION 573

### **Early Literacy Instruction**

This course concentrates on the theories, instructional applications, and materials for the teaching, learning, and assessment of literacy processes in early childhood and up to grade 2. Topics include emergent literacy, phonological awareness, and phonic knowledge and instruction.

*2 semester hour*

## Education • Educational Leadership

EDUCATION 574

### **Developmental Reading in the Elementary School**

This course focuses on the theories, instructional applications, and materials for the teaching, learning, and assessment of literacy processes in elementary classrooms. Topics include strategies in word recognition, vocabulary development, and comprehension. The developmental needs of beginning readers are emphasized.

*3 semester hours*

EDUCATION 575

### **Reading and Writing in the Content Areas**

This course focuses on the teaching and learning of comprehension and composing processes and strategies for content area disciplines. Critical reading and study strategies for expository text materials are emphasized.

*3 semester hours*

EDUC 575M concentrates on appropriate materials, strategies, and assessments for reading and writing in middle grade settings, 4-8.

EDUC 575J concentrates on the comprehension and composing processes of students in secondary-level settings, grades 7-12.

*3 semester hours*

EDUCATION 576

### **Developmental Reading in Middle Grade Classrooms**

This course focuses on the theories, instructional applications, and materials for the teaching, learning, and assessment of reading and related literacy processes in middle grade (4-8) classrooms.

*3 semester hours*

EDUCATION 580C

### **Special Problems in Elementary Education**

This is intended for students interested in independent study or research of a selected topic or problem in consultation with a faculty member. By arrangement. Faculty permission required.

*1-6 semester hours*

EDUCATION 580J

### **Special Problems in Secondary Education**

This is intended for students interested in independent study or research of a selected topic or problem in consulting with a faculty member. By arrangement. Faculty permission required.

*1-6 semester hours*

EDUCATION 580L

### **Special Problems in Behavioral Science Research and Computer Applications**

This course is designed to enhance the efficiency and scope of one's research through

the development of specific competencies needed for computer processing. Students will be exposed to computer-assisted instruction (C.A.I.) and computer managed instruction (C.M.I.), and will develop projects that focus on computer applications. By arrangement. Lab fee required.

*1-6 semester hours*

EDUCATION 590

### **Computer Literacy**

This is designed to provide the student with hands-on experience in the use and application. The student will have the opportunity to evaluate existing course work and its application as well as the writing of elementary programs in Logo and Basic. Lab fee required.

*1-3 semester hours*

EDUCATION 591

### **Software Evaluation**

This is designed to have students develop software evaluation criteria for the purpose of evaluating published computer programs. The student will have an opportunity to review educational programs.

*1-3 semester hours*

EDUCATION 592

### **Technology Literacy for Educators**

This course is an introductory to expose students to a variety of technologies used by and with persons with exceptionalities. Students will gain hands-on skills in designing technology-based instructional materials for students. A focus on Universal Design for Learning is a the core of this course with a goal of providing students with the ability to adapt technology, instruction, and assessment to meet a range of students needs.

*3 semester hours*

EDUCATION 595

### **Thesis Research — Masters Level**

This is a culminating experience option at the Master's level for Education students.

*2-6 semester hours*

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## **Educational Leadership**

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EDUCATIONAL LEADERSHIP 601

### **Introduction to Education Leadership**

This is an investigation of concepts, research findings, and practices focusing on the development and change of educational organizations in relation to relevant goals and objectives. Emphasis is placed on such areas as leadership theory and behavior; organizational climate, human relations and communications within the organization, and change strategies.

Theoretical concepts of leadership are integrated along with practical applications.

*3 semester hours*

EDUCATIONAL LEADERSHIP 611A

### **Organization, Administration, and Supervision of Reading and Language Arts Programs**

This course focuses on the role of the Reading and Language Arts Consultant as an educational leader in schools and school districts and focuses on issues of organization, administration, and supervision of reading and language arts programs. Note: Students enrolled in this course must also concurrently enroll in EDLD 611 Administration: Organizing, and Staffing Educational Institutions. While EDLD 611 focuses on the broader issues of educational leadership in schools, EDLD 611A specifically focuses on reading and language arts programs and personnel.

*1 semester hour*

EDUCATIONAL LEADERSHIP 613

### **Contemporary Issues in Education Leadership**

This course will focus upon contemporary society and changing policy issues that confront managers and leaders of educational thought throughout the 21st Century. Seminal issues such as the impact of political forces upon federal, state, and local educational policies will be considered. Labor relations will be analyzed. Empowerment of teachers will be examined.

*3 semester hours*

EDUCATION LEADERSHIP 613

### **Contemporary Issues in Education Leadership**

This is an exploration of current topics and trends that impact education leadership. The course materials will explore current trends and topics utilizing journal articles, monographs, trade news outlets and social media.

*3 semester hours*

EDUCATION LEADERSHIP 614

### **Leadership & Management of School Facilities**

The course is designed to provide the prospective school leader with a comprehensive understanding of the various issues associated with managing and planning for school facilities that enhance teaching and learning.

*3 semester hours*

EDUCATION LEADERSHIP 615

### **Research & Data Informed Supervision**

This course is designed to increase students' knowledge, understanding, and competencies required for reading and conducting educational research. The course achieves this by reviewing key concepts related to the research problem, research hypothesis, sampling, data

## Educational Leadership

collection techniques, data analysis, and research designs.

EDUCATIONAL LEADERSHIP 618

### **Public School Finance**

This is a study of educational fiscal control including: budget preparation and presentation, accounting procedures, tax structures, analyses of costs, comparative data and auditing. Includes federal, state and local phases of support of educational systems. Special emphasis is given to New York and Connecticut fiscal patterns.

*3 semester hours*

EDUCATIONAL LEADERSHIP 619

### **Public School Law**

This is a study of the legal basis for public education in the United States; a study of state and federal statutes providing for education. An examination is made of statutes, court decisions, and policies and practices arising out of these factors. The legal status of boards, teachers, administrators, pupils and parents is examined with special emphasis on New York and Connecticut.

*3 semester hours*

EDUCATIONAL LEADERSHIP 621

### **Evaluation of School Effectiveness**

This course examines the various ways to evaluate the effectiveness of a school's performance: student achievement, faculty performance, faculty morale, provision for diverse student needs and development of student emotional growth. The course examines how data can and should affect instructional issues.

*3 semester hours*

EDUCATIONAL LEADERSHIP 651

### **Curriculum Development and Implementation**

This is a study and development of models for curriculum design and implementation at all levels of schooling. Emphasis is placed on current research and practice relevant to curriculum design and the planning and monitoring of curriculum plans in educational settings. Such topics as: curriculum assumptions, goals and objectives, knowledge and content, curriculum evaluation, implementation and staff development strategies are examined.

*3 semester hours*

EDUCATIONAL LEADERSHIP 652

### **Supervision: The Evaluation and Professional Development of Educators**

This is a study of concepts and strategies focusing on the evaluation of teachers and other educators for purposes of performance improvement and quality assurance. Emphasis

will be placed on research findings, current practices, and the achievement of competency related to classroom observation and evaluation, the planning and implementation of professional development, and the creation of organizational climate and human relationships conducive to effective evaluation and professional growth of educators.

*3 semester hours*

EDUCATIONAL LEADERSHIP 664

### **Supervision of Programs & Services for Students with Exceptionalities**

This course is designed to prepare school administrators with the skills to supervise and implement appropriate services for students in need of response to intervention services and/or programs for students identified as in need of special education services. An emphasis is on service delivery models, due process procedures and supervision of specialists responsible for providing services to identified students.

*3 semester hours*

EDUCATIONAL LEADERSHIP 680A

### **Urban Leadership**

This course is designed to introduce current research, challenges and successful practices of leading schools in urban settings.

*3 semester hours*

EDUCATIONAL LEADERSHIP 681A

### **Internship in Educational Management**

A cooperatively guided administrative experience in a school system. Pre-requisite: Completion of major portion of the requirements for the Sixth Year Professional Diploma and permission of major advisor.

*3 semester hours*

EDUCATIONAL LEADERSHIP 682A

### **Special Topics in the Management of Educational Institutions**

Special department offerings including workshops, conferences, institutes focusing on new developments in the field.

*1-6 semester hours*

EDUCATIONAL LEADERSHIP 683

### **Internship for the Reading and Language Arts Consultant**

This course is a cooperatively guided administrative experience in the area of literacy education for those desiring to be certified as Reading and Language Arts Consultants. The internship includes a series of practicum experiences in a variety of school settings and includes research in the area of literacy education. Students gain practical field based experience through a range of tasks and situations characteristic of

the position of the Reading and Language Arts Consultant in school settings.

*6 semester hours*

EDUCATIONAL LEADERSHIP 800D

### **Continuing Doctoral Seminar**

The seminar meets periodically during the academic year and for two full weeks each summer, for three consecutive summers. It provides opportunities for students to work with scholars and leaders from a variety of disciplines to broaden perspectives on educational leadership and to develop an intellectual style for dealing with educational problems.

*6 semester hours per year*

EDUCATIONAL LEADERSHIP 801A

### **Educational Program Development**

Emerging trends, concepts and practices in the planning, design, and implementation of education programs intended to meet the individual and group needs of learners in a changing society are reinvestigated. Emphasis is placed on the roles and responsibilities of leaders in such processes as school/community educational goal setting, needs analysis, systematic program design, supervision and staff development. Students will focus on the application of new knowledge to the investigation and solution of program development in the field.

*6 semester hours*

EDUCATIONAL LEADERSHIP 801B

### **CURRICULA THEORY AND PROGRAM DEVELOPMENT**

This course provides an introduction to conceptions of curriculum and their effects on pedagogy from a historical perspective, with particular emphasis on discerning and interpreting how social, cultural, and political circumstances that shape educational practices. The course includes several projects focusing on the application of curriculum design principles and related instructional systems development. Emphasis is placed upon a historical overview of curricula theory and the current research and practice relevant to curriculum design, planning and monitoring in educational settings. Topics to be examined include the following: curriculum assumptions, understanding by design, concept-based curriculum and instruction, Curriculum for the 21st Century, alignment with the Common Core Instructional Standards, goals and objectives, knowledge and content standards, needs assessment and curriculum evaluation, the curriculum cycle, curriculum implementa-

## Educational Leadership

tion strategies, and professional development strategies

*6 semester hours*

EDUCATIONAL LEADERSHIP 804A

### **Constitutional, Legal, and Political Issues Confronting Educational Leaders**

Legal questions relating to personnel, students, community, religion, finance, school property, teacher organizations, equality of opportunity and other legal and political issues with which the educational leader must be familiar in order to be effective in decision-making and organizational development are investigated. Emphasis is placed on "landmark" judicial decisions, recent statutory developments, constitutional background. Students will read, analyze, and interpret significant Supreme Court decisions regarding educational matters as well as pertinent lower federal and state court decisions. The principal of "non judicial" remedies will be explored and the appeals process will be examined in detail.

*6 semester hours*

EDUCATIONAL LEADERSHIP 804B

### **Constitutional Law**

Legal questions relating to personnel, students, community, religion, finance, school property, teacher organizations, equality of opportunity and other legal and political issues with which the educational leader must be familiar in order to be effective in decision-making and organizational development are investigated. Emphasis is placed on landmark judicial decisions, recent statutory developments, and constitutional background. Students will read, analyze, and interpret significant Supreme Court decisions regarding educational matters as well as pertinent lower federal and state court decisions. The principal of non-judicial remedies will be explored and the appeals process will be examined in detail.

*6 semester hours*

EDUCATIONAL LEADERSHIP 806 A & B

### **Quantitative Analysis and Evaluation Strategies**

This course considers current techniques for designing, implementing and analyzing projects in education and typical models for facilitating decision-making. The elements of personnel and program assessment within the contemporary educational system are included. Strategies focusing upon experiential learning and community contact are featured, and the student will be exposed to collection and analysis of real data and related computer simulation activities. Statistical and evaluative investigations are emphasized which are both fundamental and sufficiently sophisticated for

advanced decision-making and leadership. This course is required.

*6 semester hours*

EDUCATIONAL LEADERSHIP 807A

### **Management of Educational Institutions (K-12)**

Participants in this course will investigate the planning and finance functions relative to the management of educational institutions. The planning component, the relationship between planning and institutional decision-making, and problems of implementing planning activities in educational contexts are considered. Finance is addressed through the treatment of budget preparation and presentation, accounting procedures, tax structures, and the role of local, state, and federal governments in support of educational system.

*6 semester hours*

EDUCATIONAL LEADERSHIP 807B

### **Leadership Theories and Organization Management**

This course investigates concepts, research findings, and practices focusing on the development and change of educational organizations in relation to relevant goals and objectives. Students investigate planning, financing and management of their own educational institution including budgets, accounting procedures, tax structures, and the role of local, state, and federal government. Emphasis is placed on leadership theories, organizational climate, human relations, and communication within organizations. The course covers a historical overview of organization and leadership theories and the culminating project is defining and defending a philosophy of leadership.

*6 semester hours*

EDUCATIONAL LEADERSHIP 808A

### **Human Relations, Communication, and Decision Making**

This course will provide educational leaders with the necessary skills and knowledge to maximize the human resources within an institution. It will develop in participant's increased personal awareness, greater sensitivity to others, effective communications and appropriate strategies for change and decision making.

*6 semester hours*

EDUCATIONAL LEADERSHIP 808B

### **Program Evaluation and Human Relations**

The structure of this seminar is three-fold. The impetuses, purposes, issues, and controversies surrounding human relations, assessment, and program evaluation with emphasis on organization development, teaching, and learning. Program evaluation techniques including mul-

iple means of assessment will be discussed and considered. Concepts such as reliability, validity, credibility, and authenticity will be explored as well as summative and formative data collection and analysis strategies. The program evaluation approach will be applied to authentic experiences and scenarios that focus on assessing and evaluating institutions, programs, teaching, and learning. Research-based factors that are associated with effective schools and how to use various sources of data to evaluate and assess educational organizations and programs is also emphasized. The process of strategic planning as a vehicle to improve school effectiveness, the Connecticut Standards for School Leaders, and Common Core Standards all provide a framework for understanding the role and responsibilities of school leaders for school improvement.

*6 semester hours*

EDUCATIONAL LEADERSHIP 811

### **Intro to Research**

Introduction to Research is an overview course in research methodology and evaluation techniques relevant to the conduct of qualitative, quantitative, action, and mixed methods studies of leadership, curriculum, teaching, and learning. Fundamentals of, quantitative, qualitative, action and mixed methods research will be introduced from five prominent dimensions: leadership, curricula, program evaluation, teaching, and assessment.

*3 semester hours*

EDUCATIONAL LEADERSHIP 810

### **Computer Application in Educational Leadership**

This course covers creation of learning objects, including text, raster/vector graphics, animation, slideshows, conferencing components, and video for instructional Webs. Use of digital image capture equipment, including digital cameras, camcorders, and scanners. Also covers basic HTML, PDF and OCR. Final project will be integration of elements into an instructional Web.

*6 semester hours*

EDUCATIONAL LEADERSHIP 812

### **Quantitative Research**

One of the greatest challenges faced by school leaders is harnessing the power of data to drive school improvement. To this end, in the present climate of rapidly emerging research findings and data-driven decision-making, today's leaders must be able to perform, analyze, and critically interpret statistics. Hence, this course is designed to prepare doctoral students to perform dissertation research by giving them

## Educational Leadership • Electrical Engineering

fundamental understanding of the quantitative research methodology. Overall, this course will provide students with: (a) the fundamental of descriptive and inferential statistics necessary to manipulate quantitative information, (b) the necessary frameworks to describe, interpret, and critique the components of various quantitative research studies in education, and (c) the conceptual understanding of the experimental and non-experimental research methodologies.

*3 semester hours*

### EDUCATIONAL LEADERSHIP 813

#### Literature Review

Literature review is designed to be taken in the summer of the first year after students have taken introductory research, quantitative research methods, and two six credit doctoral modules in the program. Conducting the literature review helps refine the student's proposal and prepares for writing the Human Subject approval application.

*3 semester hours*

### EDUCATIONAL LEADERSHIP 814

#### Qualitative Research

Qualitative research and evaluative Strategies introduces students to theoretical, paradigmatic and methodological research perspectives associated with the qualitative tradition. Case studies, grounded theory, ethnographic, and narrative approaches will be presented in this class paying particular attention to interpretive, critical, and participatory research techniques, methodologies and methods. Qualitative evaluation techniques used in program evaluations will be emphasized. EDUCATIONAL LEADERSHIP 814 introduces students to practical research techniques including the development of semi structured and open ended interview questions, how to conduct, record and analyze interviews, and the use of field notes when collecting observation data. Emphasis will be placed on understanding the ramifications of purposeful sampling, forms of credibility, the role of the researcher, and ethical dimensions associated with qualitative inquiry.

*3 semester hours*

### EDUCATIONAL LEADERSHIP 815

#### Mixed Methods

Mixed method research introduces students to mixed-method research in the social sciences. Students should have some familiarity with research (quantitative and/or qualitative) and the epistemological and ontological underpinnings of the two methods as well as a basic understanding of their educational or social sci-

ence research topic. This course completes the process of the proposal preparation expanding methodological and procedural techniques used in dissertation process. Specific objectives for this course include: (a) the history and language of mixed method research in education/social sciences; (b) summarization of current issues related to the paradigm wars and where mixed-methods research currently fits into education/social sciences; (c) advance understanding of research issued in educational/social sciences through discussions about paradigmatic compatibility, the current standing of mixed-methods in academic and political field, and the process and design of mixed-method studies; (d) proposal writing strategies including for mixed-methods research; (e) data sampling, collection and analysis strategies including for mixed method research; (f) reflections about the role of the researcher and their worldview in a mixed methods design. Although mixed-methods is an emerging dialog in education and social sciences, there are variety of sources available including keynote speeches, edited books, journal articles, editorials and seminal works from the leaders in the field cited in prominent mixed-method research publications. Supplemental articles and chapters will be provided depending on the students' level of interest and needs. Students preparing their dissertation will have these available these resources when expanding their methodology and procedures sections of their study.

*3 semester hours*

### EDUCATIONAL LEADERSHIP 816

#### Action Research Project

The Action Research seminar is the second year summer project designed to help students understand how to conduct, evaluate and disseminate research. This culminating research projects starts after students have completed introduction (EDUCATIONAL LEADERSHIP 811), quantitative (EDUCATIONAL LEADERSHIP 812) qualitative (EDUCATIONAL LEADERSHIP 814) and mixed method research (EDUCATIONAL LEADERSHIP 815) in the second year of program. Conducting a collaborative action research projects helps refine practical research skills, presentation techniques, and the ability to publish.

*3 semester hours (3 Credits-Repeatable up to 2X)*

*Postsecondary Teaching Experience*

### EDUCATIONAL LEADERSHIP 817

#### Postsecondary Teaching

Post-secondary teaching provides students the opportunity to determine if working in higher education is preferred. This class is to

be taken as a final class in the program course sequence. Repeatable up to 8 credits.

*2 semester hours*

*(2 Credits Repeatable up to 4X)*

### EDUCATIONAL LEADERSHIP 845A

#### Dissertation Preparation Seminar

During the third year of the program, students participate in seminars which focus on the selection and development of a dissertation proposal. Students are ordinarily expected to complete the major portion of their work on the dissertation proposal prior to the conclusion of the formal part of the program. This course is required.

*3 semester hours each term (Fall & Spring), 6 semester hours final summer*

### EDUCATIONAL LEADERSHIP 845B

#### Comprehensive Examination Preparation

During the third year of the program, students participate in this seminar in preparation for their 30 day, 3 question 45+ page comprehensive examination. Students should only take EDUCATIONAL LEADERSHIP 845 after they have completed all of their courses or with the prior approval of their Chair.

*3 semester hours*

### EDUCATIONAL LEADERSHIP 850A

#### Dissertation Research and Advisement

Individual research and advisement relative to a student's dissertation topic is the "sine qua non" of this course. Doctoral candidates are required to register for Education Management 850 continuously until their dissertations have received final approval. Prerequisite: Successful completion of Comprehensive Examination.

*0 semester hours*

### EDUCATIONAL LEADERSHIP 850B

#### Continuous Dissertation

Individual research and advisement relative to a student's dissertation topic is the sine qua non of this course. Doctoral candidates are required to register for Continuous Dissertation 850 every semester (Fall, Spring and Summer) until their dissertations have received final approval. Prerequisite: Successful completion of EDUCATIONAL LEADERSHIP 845 Dissertation Proposal and EDUCATIONAL LEADERSHIP 846 Comprehensive Examination.

*0 semester hours*

### EDUCATIONAL LEADERSHIP 864

#### Special Education for Administrators Supervision of Programs & Services for Students with Exceptionalities.

This course is designed to prepare school administrators with the skills to supervise and

## Electrical Engineering

implement appropriate services for students in need of response to intervention services and/or programs for students identified as in need of special education services. An emphasis is on service delivery models, due process procedures and supervision of specialists responsible for providing services to identified students.

*3 semester hours*

EDUCATIONAL LEADERSHIP 881A

### **Administrative Internship + CAT Exam**

A cooperatively guided administrative experience in a school system. Pre-requisite: Completion of major portion of the requirements for the Sixth Year Professional Diploma and permission of major advisor.

*3 semester hours + CAT Exam*

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## Electrical Engineering

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ELECTRICAL ENGINEERING 403

### **RF VLSI**

The course covers fundamental concepts of RF circuit design. Students will learn circuit level design of high speed analog/RF circuits. Specific topics include impact of scaling and noise in high-speed communication circuits, low noise amplifiers, mixers, power amplifiers and frequency synthesizers.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 404

### **Digital VLSI**

The objective of this course is to teach students the CMOS transistor design in VLSI circuits. (CMOS stands for complementary metal oxide semiconductor.) Supported by CAD tools, students will learn gate level design, IC design, fabrication, and layout of digital CMOS integrated circuits. With these skills, students will also be able to interact with integrated circuit fabrication process engineers after completing this course.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 405

### **Random Signal Processing**

Topics in the course Statistics for Engineers and Random Signal Processing are the same. However, Random Signal Processing is a better title, since it pertains to modern applications of statistics for Engineers in the real world.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 406

### **Soft Computing I**

Modeling and solving engineering problems using computational methods. Topics include exact (provable) methods (linear and convex

programming) and fast methods (heuristic search, genetic algorithm, neural networks, etc.).

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 407

### **Fuzzy Logic Systems**

A study of fuzzy set theory and applications. Topics include (a) fundamental concepts of fuzzy logic, (b) fuzzy sets, (c) fuzzy model identification, (d) neuro-fuzzy systems, (e) fuzzy logic in control engineering, and (f) fuzzy logic in pattern recognition and artificial intelligence.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 409

### **Data Acq & Virtual Instr Lab**

This is an introductory lab for the real-time data acquisition and instrument controls. The purpose of this course is to introduce students to the field of data communication between the computers and instruments with experiments. These experiments cover the LabView programming for the interface to communicate with different instruments or data acquisition boards through GPIB, RS232, and USB cables. After the students complete this course, they are expected to be able to set up their own systems for different testing and controls.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 410 (ELEG 410/BMEG 410)

### **Bio Sensors**

This course will provide an interview of biosensors, including their use in Pharmaceutical research, diagnostic testing, and policing the environment. Topics include the sensitivity, resolution, selectivity, dynamic range, and noise of biosensors. Other topics covered include transducer phenomenology, biosensor structure, and sensor performance.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 411

### **Plc Solutions in Industrial Applications**

This course builds on PLC's (ELEG 464) by using sensors (both thermal sensors, motion sensors, and camera input) to control the automation process; topics in servo motors, variable frequency drives, and HMI (human machine interaction) and touch screens are also introduced both in theory and in a lab setting. Prerequisite: Electrical Engineering 464.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 412

### **Bioelectronics**

Discipline of biomedical Engineering has emerged due to integration of engineering

principles and technology into medicine. This course is intended for engineers and engineering students interested in pursuing careers in biomedical engineering and health related field. This course will first introduction Applications of electrical engineering principles to biology, medicine, behavior, or health will be identified during first half of the semester. Second half of the course will focus on research, design, development and application of biosensors and Bioelectronics.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 413 (ELEG 413/CPSC 413)

### **Bioinformatics**

The course covers algorithmic aspects of modern DNA and protein analysis. Topics include: (i) Reviews of DNA, RNA and Proteins, (ii) Genome rearrangements, (iii) Sequence Alignment and fast algorithms (BLAST), (iv) Genome expressions and DNA-microarray, (v) Phylogenetic trees, (vi) Protein docking and drug discovery, etc.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 414

### **Laser Applications**

Course studies (i) fundamentals of laser operation and the types of laser operation, (ii) laser applications in spectroscopy and photochemistry, (iii) laser applications in dentistry and eye surgery (LASIK), and (iv) laser applications in bar code readers and welding/cutting.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 415

### **Fiber Optics**

Communication via light waves over fiber optics cables. Analysis of light emission and light detection. Absorption loss. Optical devices, connectors, splices and Local Area Networks (LANs). Pre-requisite: Physics 112 or equivalent.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 416

### **Fiber Optics Lab**

Hands on experience with fiber optic hardware. Fiber properties, sources, detectors, splices, connectors. Design and test fiber optic transmission and receiver circuits for both analog and digital transmission. Pre-requisite: Electrical Engineering 415.

*3 semester hours*

ELECTRICAL ENGINEERING 417

### **Modern Electronics**

Application of diodes, bipolar transistors (BJT) and field effect transistors (FET) to signal amplification and switching. Computer Simulation.

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3 semester hours

ELECTRICAL ENGINEERING 419

## Fuel Cells

3 semester hours

ELECTRICAL ENGINEERING 428 (ELEG 428/BMEG 428)

## Modern Wireless Communications

Evolution of Mobile Radio Communications to cell phones and personal communications: 2nd and 3rd and 4th generation. Concepts include cell fundamentals, path loss, fading, ghosts, modulation techniques, equalization, speech coding and networks.

3 lecture hours, 3 semester hours

ELECTRICAL ENGINEERING 430

## Satellite/Wireless communication Systems

Detailing concepts and calculations from the entire field is enough to permit the kinds of analysis needed for major systems planning decisions. This course covers channel capacity, picture quality, signal to noise ratio, bit error rate, earth station antenna size and offers new materials on orbital mechanics and geometry. Pre-requisite: Electrical Engineering 441 or equivalent.

3 semester hours

ELECTRICAL ENGINEERING 431

## Fields Theory

The course covers fundamental concepts of RF circuit design. Students will learn circuit level design of high speed analog/RF circuits. Specific topics include impact of scaling and noise in high-speed communication circuits, low noise amplifiers, mixers, power amplifiers and frequency synthesizers.

3 lecture hours; 3 semester hours

ELECTRICAL ENGINEERING 434

## Power System Protection and Relaying

This course introduces students to the basic concepts and fundamentals of the electric power system protection and relaying. It teaches the methodology to model the different electric component of the power system such as bus bars, generators, motors, transmission lines, and transformers. Also, it analyzes the different types of symmetrical and asymmetrical short circuit faults along with the different protection schemes used to protect the power system component. It presents the philosophy of protecting the power systems and discusses the fundamental relay operating principles and characteristics. It explores the different types of relays and measuring instruments. Finally, it introduces practical techniques/applications and relaying systems used to protect real-life transmission and distribution systems/components.

3 semester hours

ELECTRICAL ENGINEERING 435

## Electric Machines

The course introduces the laws of electricity and magnetism and principles of transformers applicable to electric machine construction. Machines studied include DC motors, AC induction motors, synchronous motors, stepper motors, relays, and motor/generators. Both single phase and 3-phase motors are analyzed for their efficiency, speed, and mechanical stability. The state of the art VFD (Variable frequency drive) is shown to be the best way to improve efficiency and produce the maximum torque and speed control for any given motor.

3 semester hours

ELECTRICAL ENGINEERING 437

## Microwaves

Passive and Active elements for the generation, modulation, amplification and reception of microwaves. Radar and other microwaves systems. Pre-requisite: Field Theory.

3 lecture hours; 3 semester hours

ELECTRICAL ENGINEERING 438

## Power Analysis

3 lecture hours; 3 semester hours

ELECTRICAL ENGINEERING 439

## Radar Thry & Sim

Radar Fundamentals, Radar Cross section, Types of Radars, Radar Detection, Waveform Analysis, SNR, Compression and Wave Propagation. Target Indicator and Tracking. The course will include extensive use of MATLAB for programming and simulation.

3 lecture hours; 3 semester hours

ELECTRICAL ENGINEERING 440

## Distribution Power System Design

A comprehensive study of modeling of the distribution of power system components and planning, including load characteristics, application of power transformers, design of transmission lines, distribution sub-stations, primary systems and secondary systems, voltage drop and power loss calculations, application of capacitors, harmonics on distribution systems, voltage regulation, fault calculation and protection.

3 lecture hours; 3 semester hours

ELECTRICAL ENGINEERING 441

## RF Communications

Spectral analysis; modulation and demodulation system analysis, including AM, FM, pulse modulation and transmission of digital information. Signal design and system considerations. Pre-requisite: Electrical Engineering 234.

3 semester hours

ELECTRICAL ENGINEERING 442

## Digital Communications

Detection of noise in thermal noise. Digital sequences. Optimal filtering and statistical decision theory. Optimum receiver design criteria. Performance, configuration and trade-offs. Pre-requisite: Electrical Engineering 441.

3 lecture hours, 3 semester hours

ELECTRICAL ENGINEERING 443

## Digital Signal Proc I

The FFT Spectral Analysis, Filtering in the presence of noise. Correlation. Introduction to stochastic signal processing. Computer projects. Pre-requisite: Electrical Engineering 234 or equivalent.

3 lecture hours, 3 semester hours

ELECTRICAL ENGINEERING 444

## Power Electronics

Application of power diodes and power transistors in rectifier arrangements and voltage regulators. Properties and application in power converters, inverters and motor drives. Pre-requisite: Electrical Engineering 348.

3 lecture hours, 3 semester hours

ELECTRICAL ENGINEERING 445

## DC/AC Motor Drives

Application to control speed and efficiency of motors using conventional thyristors control as well as modern variable frequency drives.

3 lecture hours, 3 semester hours

ELECTRICAL ENGINEERING 446 (ELEG 446)

## MEMS (Micro-Electro-Mechanical Systems)

MEMS (Microelectromechanical systems) refers to devices and system with very small size in the range of microns. It is one of the most important high technologies developed in 20th century. This course covers the fundamentals of MEMS. It includes the introduction to MEMS, basic microfabrication techniques, MEMS materials and their properties, MEMS device design and simulation, working principle analysis, MEMS device fabrication sequence, MEMS packaging and assembly, signal testing, MEMS applications (inertial MEMS, MOEMS, BioMEMS, RFMEMS, etc.).

3 lecture hours, 3 semester hours

ELECTRICAL ENGINEERING 447

## Semiconductors

Crystal fabrication: MBE, MOCVD, LEC, Bridge Mann. Study material and electronic properties of single crystal Si, poly, a-Si, GaAs, GaN, SiC, Ge and II-VI compounds. Transport properties: Hall Peltier, resistivity, mobility. Analysis of capacitance and I/V data for pn, pin, schott-

# Electrical Engineering

ky and hetero-junction devices. Pre-requisite: Mathematics 110.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 448

### Microelectronic Fabrication

This class covers basic microfabrication processes for semiconductor and VLSI fabrication, including photolithography, plasma and reactive ion etching, ion implantation, diffusion, oxidation, evaporation, vapor phase epitaxial growth, sputtering, and CVD. Advanced processing topics such as next generation lithography, MBE, and metal organic CVD are also introduced. The physics and chemistry of each process are introduced along with descriptions of the equipment used for the manufacture of integrated circuits. The integration of microfabrication process into CMOS, bipolar, and MEMS technologies are also discussed. The purpose of this course is to provide students with technical background and knowledge in silicon microelectronic fabrication process. Upon finishing this course, students will be familiar with the basic semiconductor and VLSI microfabrication processes.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 449

### Wireless Sensor Networks

Course studies wireless sensor nodes, which are small, low cost, low power, multifunctional sensor nodes with the capability of sensing certain physical properties, local data processing, and wireless communications. Focus will be on real time applications in software and hardware. The architecture of networks will also be utilized and perfected.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 450

### Communications Lab

Hands-on experience with digital and analog communication equipment, AM, FM and digital modulation techniques. Design and test of optimal configuration. Measurement of performance parameters in the presence of thermal noise. Pre-requisite: Electrical engineering 441.

*3 semester hours*

## ELECTRICAL ENGINEERING 451

### Introduction to Nanotechnology

Nanotechnology is the science and engineering involved in the design, synthesis, characterization and application of materials and devices with the size in nanometer (10-9m) scale. As a newly emerged exciting high-technology, it has attracted intensive interest and heavy investments around the world. Nanotechnology is a general-purpose technology

which will have significant impact on almost all industries and all areas of society. It can offer better built, longer lasting, cleanser, safer and smarter products for home, communications, medicine, transportation, agriculture and many other fields. This course will cover basic concepts in nanoscience and nanotechnology.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 452

### Multimedia Processing

Using state-of-the-art software and hardware, this course shows how to process multi-media signals (for example speech, MPEG, HDTV, video, images). The course teaches how to represent these signals mathematically, how to compress the data in these signals to fit into a limited workspace, and how to make the processing networks and the signals themselves secure against hackers. Part of the course involves a research project.

*3 semester hours*

## ELECTRICAL ENGINEERING 453

### Pattern Recognition

Operation and Design of systems that recognize patterns in data, based primarily on statistical and neural network approaches. Topics include Bayesian decision theory, Parametric likelihood estimation, Nonparametric techniques, Linear discriminant functions and Neural Networks.

## ELECTRICAL ENGINEERING 454

### Introduction to Audio Signal Processing

To introduce the fundamentals of speech processing and related applications. Course covers speech enhancement, speech coding, and speech recognition.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 455

### Microwave Lab

Hands on experience with basic microwave coaxial and wave guide components in various circuit configurations. Measurement of power, wavelength, VSWR, attenuation, directional coupling, impedance. Use of the smith chart. Pre-requisite: Electrical Engineering 437.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 456

### Adaptive Signal Processing

This course introduces students to the field of adaptive signal processing as well as several practical aspects of adaptive systems. This course provides an in-depth analysis of various adaptation algorithms such as least mean square adaptive filters, recursive least squares algorithms, and Kalman filters etc. The subject learning is enhanced through experimentation

of adaption techniques using Matlab and/or Labview projects centered on applications such as adaptive noise/interference cancellation, signal estimation/ detection, and system identification etc.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 458 (ELEG 458/CPEG 458)

### Analog VLSI

Modeling, design and analysis of analog VLSI circuits. CMOS processing and layout, current mirrors, Opamp, comparators, S/H voltage references, switched-capacitor circuits, data converters, filters and PLLs. Students design analog VLSI layouts, extract the netlists and simulate the circuit behavior. Transistors sizing will also be discussed. EDA tools PSPICE, Mentors Graphics are used.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 459

### Audio Processing Lab

Introduction to TMS320C55x Digital signal Processor, Audio Signal Processing, Basic Principles of Audio Coding, Speech Enhancement Techniques, Quantization of Audio signals, Calculating LPC coefficient using C55x Intrinsic, Matlab Implementations of noise Reduction (NR), Mixed C55x Assembly and Intrinsic Implementations of Voice Activity Detection (VAD), Combining AEC with NR, Voice over Internet Protocol Applications, Overview of CELP Vocoders.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 460

### Controls

Analysis of steady state and transient response of control systems. Laplace transforms methods. Transfer functions. Stability criteria. Nyquist, Bode and root locus methods. System stabilization. System Design.

*3 lecture hours, 3 semester hours*

## ELECTRICAL ENGINEERING 461

### Controls Lab

Laboratory study of feedback control systems with experiments analyzing different types of plants, transducers and control techniques; emphasis on real-time computer control.

*3 lab hours, 3 semester hours*

## ELECTRICAL ENGINEERING 462

### Advanced Controls

This is a graduate level course and aims to introduce the analysis of nonlinear system. The course will cover: the state space description of nonlinear system; the phase portrait analysis of the second order system; stability analysis

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of the nonlinear system based on linearization method; the Lyapunov stability theory, etc.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 463

## Industrial Controls & Instrumentation

This course covers the basics of Industrial Controls, including but not limited to relay control, ladders, counters, timers, switches, and all electrical components necessary to program the control of a large machine.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 464

## PLC's (Programmable Logic Controls)

This course will start with the basics of Boolean Algebra; it will cite the differences between PLC control and relay control and full automation of major machines and appliances; the differences in these controls will show how hard relay control is to implement and how flexible PLC control actually is; many different math functions will be analyzed and implemented in the theoretical construction of fully functioning PLC.  
*3 lecture hours, 3 semester hours*

ELECTRICAL ENGINEERING 465

## Introduction to Robotics

Basic robotics including: position and velocity sensing, actuators, control theory, robot coordinate systems, robot kinematics, differential motions, path control, dynamics, and force control. Robot sensing, simulation of manipulators, automation, and robot programming languages are also investigated. Prerequisite: Computer Science 102, Match 214 or Math 314, or permission of instructor.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 467

## Introduction to Mechatronics

This course covers development of Mechatronics theory and application to intelligent systems dependent upon the integrated disciplines of mechanical, electronic, computer and software engineering. The course examines the following: mechatronics system design, sensors and transducers, actuating devices, signals systems and controls, real-time interfacing, hardware components and software with applications in mechatronics.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 479

## Solar Energy and Solar Cells

This course offers a review of renewable energy (solar, winds, and tides) versus bio-energy (coal, oil, natural gas). The concept of light as electromagnetic radiation and pure energy as well as the concepts of converting

sunlight into thermal energy will be discussed. Students will learn the semiconductor and electronic properties of solar cells, used to convert light into electricity. Secondary solar energy sources include solar Hydrogen and concentrator technology.  
*3 semester hours*

ELECTRICAL ENGINEERING 480

## Digital Electronics

*3 semester hours*

ELECTRICAL ENGINEERING 481

## Analog Electronics Lab

With a set of 6 experiments and simulating them using P-Spice, the goal of this course is to teach the concepts from the theory of analog electronics. The user must have solid understanding of the basic electronics and circuit theory aka Network Analysis. Pre-requisite: Electrical Engineering 348, 234 or equivalents.  
*3 semester hours*

ELECTRICAL ENGINEERING 482

## Analog Integrated Circuit Design

Do a complete analysis of the 741 op-amp, including bandwidth, gain analysis, slew rate, power efficiency and I/O impedances. Analyze ROM, Ram, TTL, ECL, CMOS and more modern logic structures including Fanout, noise margin, latching, contention, logic and delay response. Pre-requisite: Electrical Engineering 348.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 483 (ELEG 483/MEEG 483)

## Digital Integrated Circuit Design

Several integrated circuit architectures are analyzed at the transmitter level to find key parameters by hand analysis as well as computer simulation: rise time, fall time, noise margins, logic state, hysteresis/memory, fanout, and power dissipation. Analysis includes an analysis of the major logic families: TTL, CMOS, NMOS, ECL, PECL, differential logic.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 490

## Sustainable Energy

This is a graduate level course and aims to introduce the alternative energy technologies in photovoltaic cells (PV) and fuel cells. It will cover: the physics, energy conversion efficiency, and challenges in PV cells, the principles, the stack and system design in fuel cells.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 492

## Sustainable Energy Lab

*3 semester hours*

ELECTRICAL ENGINEERING 500

## Graduate Co-op/Internship in Electrical

## Engineering

By arrangement.  
*1-3 semester hours*

ELECTRICAL ENGINEERING 503

## Electronic Cooling

*3 semester hours*

ELECTRICAL ENGINEERING 510

## Medical Machines

Electrical safety is studied by full analysis of grounding and modeling of the human body under various electric shock conditions. The ECG machine (for measuring heart performance) is analyzed as both an analog and a digital machine, with emphasis on cleaning up signal problems and extending the analysis of the data recorded. Other instruments that are analyzed include the blood sugar tester, the hospital thermistor, the lung pressure machine, the anesthesia vaporizer, the pulse oximeter and various cardiac output devices. Discussion made about the minimum alveolar concentration (MAC) as it applies to anesthesia. Discussion is also made about modern hearing aids and advances in eye replacement via electrical means. Pre-requisite: Electrical Engineering 348, 234 or equivalent.  
*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 511

## Medical Machines - Signal Processing

Students learn to obtain, process, and interpret data from various Medical Machines (e.g. EEG, ECG, EMG, pulse oximeter, spirometer, blood pressure, skin resistance). Students analyze data via the computer package MATLAB.  
*3 semester hours*

ELECTRICAL ENGINEERING 513

## Biomedical Image Processing (Elective)

The content of this course include the fundamentals of Digital Image Processing and its applications in biomedical field. Sampling and Quantization of signals are mentioned in order to introduce the digital images, some basic relationship between pixels are mentioned. Introduction to Fourier Transform, Discrete Fourier Transform and Fast Fourier Transformed are explained. MATLAB programming with Image Processing Toolbox will be introduced to empathize and rigid the understanding of students. Others important fundamental theorems, e.g., Image Enhancement, Image Segmentation, Representation and Description are also mentioned. Students are required to implement some program using theorems learnt in classes.  
*3 semester hours*

ELECTRICAL ENGINEERING 515

# Electrical Engineering

## Fiber Optic Networks

This course focuses on architectures, design and control of multi-wavelength optical communication networks. This includes OSI, TCP/IP, and MPLS layers. It also includes a study of WDM network elements and components. Physical and link layers will be covered to understand the advantages and limitations of optical transmission technology, including SONET, CFP, Gigabit Ethernet, and packet switching.

*3 semester hours*

ELECTRICAL ENGINEERING 542

## Advanced DSP (digital signal processing)

(1)review briefly the concepts of DSP (E443), including digital filter design and windowing (2) Carry on with new topics in Adaptive Filters, Wiener Filters, Kalman filters, power spectrum and related topics, statistical signal processing, and stochastic processes.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 543 (ELEG 543/BMEG 543)

## Digital Signal Processing Lab

Centered on a set of experiments for the ADSP21061 and ADS21065L, the goal of this course is to teach how to program the ADSP21061 and ADS21065L using visual DSP++ and MATLAB and illustrate concepts from theory of digital signal processing. The user must have solid understanding of DSP algorithms as well as an appreciation of basic computer architecture concepts. Pre-requisite: Electrical Engineering 443 or equivalent.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 544

## Wavelets and Filter Banks

This course is offered to provide students with the basic understanding of the wavelet theory along with multi-resolution signal processing tools, which can be employed effectively to solve practical signal processing and analysis problems. The first half of the course introduces wavelet transforms from an engineering point of view. The topics covered include short time Fourier transform, continuous wavelet transform, and discrete wavelet transform and filter banks. The second half of the course presents a number of interesting applications of wavelets based advanced signal processing techniques such as filter banks, multi-rate signal processing, wavelet packets and lifting algorithms in areas of image compression, signal de-noising, signal estimation, signal enhancements, and transient detection etc. Prerequisites: Basic Digital Signal Processing Course.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 546 (ELEG 546/MEEG 546)

## Biomedical and Biometric Signal Processing

The course teaches all of the basics of image processing as applied to biometrics analysis and medical imaging.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 547

## Bio MEMS

BioMEMS is the application of MEMS (Micro-electromechanical Systems) technology in the fields of biomedical and health sciences. Due to their small size, BioMEMS have the advantages of low weight, low cost, quick response, high throughput, high efficiency, requiring much less sample. Reagent and easy Integration. BioMEMS found broad applications in disease diagnosis, prevention and treatment. Various BioMEMS products have been developed, such as microfluidic devices, neural interface devices, uTAS, lab-on-a-chip, DNA chips, micro drug delivery system, microsurgical tools, bio-sensors. This course introduces to students the fundamentals of BioMEMS technology, typical bioMEMS devices and their applications.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 548 (ELEG 548/CPEG 548)

## Low Power VLSI Circuit Design

With the rapid development of mobile computing, low power VLSI design has become a very important issue in the VLSI industry. A variety of low-power design methods are employed to reduce power dissipation of VLSI chips. This course is designed to cover low-power design methodologies at various design levels (from system level to transistor level). The basic low-power design strategies will be introduced in the class. Students will use the learned knowledge to design low-power VLSI circuits. Upon completion of this course, students will be able to analyze the power consumption of VLSI circuits, and design low-power VLSI circuits using various strategies at different design levels. The major target is to design VLSI chips used for battery-powered systems and high-performance circuits not exceeding power limits.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 549

## VLSI Testing

As VLSI continues to grow in its complexity, VLSI testing and design-for-testability are becoming more and more important issues. This course will cover VLSI testing techniques such as VLSI fault modeling (stuck-at-fault), automatic test generation, memory testing, design for testability (DFT), etc. VLSI scan testing and

built-in self-test (BIST) will also be covered. Student will learn various VLSI testing strategies and how to design a testable VLSI circuit.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 550

## VLSI: Digital System Design

This course will provide students with an in-depth understanding of the basic design methodologies of modern digital VLSI systems. Various perspectives of VLSI systems will be discussed, such as MOS transistor device characteristics, interconnect, time and power, clock distribution, packaging and I/O issues, VHDL system design and logic synthesis. Upon completing this course, students will have a comprehensive understanding about digital VLSI system design.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 559

## Adv Digital Signal Proc Lab

Lecture will cover background material pertinent to lab, in these areas: The acoustics and acoustic analysis of audio/speech. The physiology of audio/speech production. Sentence-level phenomena. The perception of audio/speech. Audio/Speech disorders. Echo Cancellation. Prerequisite: Electrical Engineering 543.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 561

## Instrumental Analysis Nanomaterials

The course will give an overview on several important analytical tools for nano materials characterization. Mechanical, electrical and electronic and biological property testing of the nano materials such as carbon nanotubes, metal nanoparticles, quantum dots, nanowires conformable nanoelectronics materials, polymer nanoparticles and biomedical nanomaterials will be discussed. Process and product evaluation by physical, chemical and microscopic methods for materials in nano-regime will be highlighted. Modern materials science depends on the use of a battery of analytical methods carried normally in specialized laboratories. This course explains the fundamental principles associated with various methods and familiarize the students with them, their range of applicability and reliability especially when materials are of nanoscopic dimension.

*3 lecture hours; 3 semester hours*

ELECTRICAL ENGINEERING 562 (ELEG 5623/MEEG 562)

## Nanofabrication with Soft Materials

This is an advanced level graduate course focusing on fabrication of soft materials. Nanofabrication processes and nanosystem products will be discussed. Fundamentals associated with chips fabrications and linking them to-

## Electrical Engineering • Engineering • Finance

ward soft materials assembly will be detailed. Emerging nanotechnology based methods for soft and green electronics, mechanical parts, MEMS, PCBS will be covered. Gene chip, label free sensory assay using micro and nanofluidics will be discussed. Transfer printing, DNA-protein interactions using the chip and several nano-scale assemblies for soft materials fabrication will be discussed.

*3 semester credits*

### ELECTRICAL ENGINEERING 573

#### **Magneto Bio-Engineering**

Magneto-Bioengineering is a fast-developing field of research, its practical and environmental aspects being a topic of ever-increasing number of applications encompassing the field of biomedical engineering including but not limited to MRI (magnetic Resonance Imaging), magnetic therapy, neural stimulation, magnetic field treatment for nonunion (fractures that fail to heal) and so on. At the same time, physically, the biological effects of weak magnetic fields or Extremely Low Frequency (ELF) magnetic fields are still regarded as a paradox. This course deals with such issues and fills in the theoretical gap in biomedical engineering. It reviews and analyzes the experimental evidence that yields useful insights into the primary physical processes of magneto-reception and the frequency and amplitude spectra of the action of weak magnetic fields in living system and hence the course addresses important issues in biomedical engineering. Also, the course reviews the available hypothetical mechanisms for that action as applicable to the field of biomedical engineering. Besides this the presence of magnetic crystals in certain species of prokaryotes as well as in birds (for migration) and in humans is still under active investigation and is also covered in this course as a possible way of exploiting such information for application in biomedical engineering.

*3 lecture hours; 3 semester hours*

### ELECTRICAL ENGINEERING 579

#### **Magneto Bio-Engineering**

Over the past few decades rapid developments in genomic and molecular research and development in information technology have combined to produce a tremendous amount of information related to molecular bioengineering. This course focuses on designing and development of algorithms for biological problems. String, Tree and Sequencing algorithms are studied in this course to solve biological problems. Student will work with popular string based bioinformatics algorithms

not only to understand algorithms design methodologies but also to identify the potential weaknesses in traditional bioinformatics algorithms. Labs are workshops are integral part of the course. Practical exercises using both bioinformatics software and simple Java programs will help students understand how bioinformatics algorithms really work. The course is aimed both at biomedical engineering and computer science students. Though no prior experience in Java is required, students are expected to have mathematics and some programming background. During the course students are expected to attend workshops and labs in addition to that they are expected to spend few hours weekly in computer lab to solve problems and learn required programming skills. The class discussion will focus on solving computational problems, such as Mappings DNA, Sequencing DNA, Comparing sequences, Predicting genes, Finding Signals, Identifying proteins, etc.

*3 lecture hours; 3 semester hours*

### ELECTRICAL ENGINEERING 580

#### **New Product Commercialization**

The objectives of the course are to understand and apply concepts and techniques of product commercialization. The course focuses on taking student created product concepts and having student teams drive the concepts to become actual products. Product design, prototype creation, market analysis, and financial analysis all come together within the student team to create a viable product. If ideas are worthy, teams may work with the University's CTech IncUBator to actually commercialize their products. Students are strongly encouraged to find a sponsor to actually commercialize their product ideas.

*3 credit hours*

### ELECTRICAL ENGINEERING 596

#### **Seminar**

Lecture hours and topics to be arranged with instructor. Prerequisite: Electrical Engineering 597 or 598.

*1 credit hour*

### ELECTRICAL ENGINEERING 597

#### **Master's Project**

Lecture hours and topics to be arranged with Department Chair.

*3 credit hour*

### ELECTRICAL ENGINEERING 598

#### **Thesis in Electrical Engineering**

Lecture hours, semester hours and topics to be arranged with Department Chair.

*3-6 credit hours*

### ELECTRICAL ENGINEERING 599

#### **Independent Study in Electrical Engineering**

Independent study of advanced topics in Electrical Engineering and submission of project report as required. Problem assignment to be arranged with and approved by the Department Chair.

*3 credit hours*

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## Engineering

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### ENGINEERING 111

#### **Introduction to Engineering**

This course introduces the student to the engineering design process on a beginning level. Emphasis is placed on the structure of the design process involving problem definition, development of alternatives, analysis, decision making and iteration. One guided design project and one independent project are completed by student project teams. Concurrent lectures and homework assignments develop skills in data management, mechanics, chemistry, electrical theory, energy and economics. Personal computer usage is emphasized for mathematical calculations and the preparation of engineering reports. Prerequisite: MATH 109.

*3 semester hours.*

### ENGINEERING 300

#### **Economics and Management of Engineering Project**

The design process, engineering economics, project planning and ethics in engineering practice.

*Prerequisites: MATH 215, PHYS112 and junior standing.*

*3 semester hours.*

### ENGINEERING 400

#### **Engineering Colloquia Series**

This course is a series of seminars covering a spectrum of engineering topics. National and international distinguished speakers are invited to deliver the seminars. All Engineering students are required to register for the colloquia series.

*1 semester hour*

### ENGINEERING 404

#### **Optimization**

Optimization is the maximization of an objective function involving multiple variables, subject to certain constraints. This course introduces the theory and application of optimization. Topics discussed include optimization, linear programming, the simplex algorithm, transportation, assignment, decision analysis. Software used includes Excel spread sheet and

# Finance

LINGO.

3 semester hours

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## Finance

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FINANCE 400

### Financial Management

This course provides students with the opportunity to learn the basic tools and concepts of financial management. It will discuss important issues in modern finance, including the time value of money, valuation of stock and bonds, capital budgeting, risk and return tradeoff, portfolio analysis, capital asset pricing model and financing decisions. Basic accounting and statistics are essential to understanding the principles developed in this course. Prerequisites: Admission to graduate study. Prerequisites: FIN 400 and completion of all required Finance concentration courses or concurrent registration in final required concentration courses.

3 semester credits

FINANCE 505

### Advanced Financial Management and Policy

This course provides a general survey of the body of knowledge of corporate finance. Corporate finance is an area of finance dealing with the financial decisions corporations make and the tools and analyses used to make these decisions. The primary goal of corporate finance is to enhance corporate value and shareholder's wealth. To achieve this goal, financial managers must make important decisions such as project evaluations and investment decisions, financing decisions and dividend decisions. A solid understanding of the financial markets is also essential. The main concepts and principles in the study of corporate finance are also applicable to the financial problems of all kinds of firms. Basic accounting and statistics are essential to understanding the principles developed in this course.

3 semester credits

FINANCE 510

### International Accounting

This is an introductory course about international financial management with special emphasis on multinational enterprises (MNEs). A MNE is defined broadly as one that is incorporated in one country but has operating subsidiaries, branches or affiliates located in other countries. Today, almost all large companies are multinational with the 1,000 largest MNEs accounting for about 80% of the world's industrial production. Main topics to be covered in this course include the foreign

exchange market, exchange rate determination, foreign exchange risk management, and global debt and equity financing. The global financial environment such as the international monetary system and the balance of payments are also discussed. Prerequisites: FIN 400 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

FINANCE 520

### Investment Analysis

This course provides a framework for the analysis of individual securities such as stocks, bonds and other financial instruments. It develops a systematic framework for the construction of efficient portfolios and optimal investment strategies. It also discusses the investment environment that includes the financial markets and major financial institutions, the Federal Reserve, and the determination of interest rates. Various investment strategies used by practitioners are also discussed. Prerequisites: FIN 400 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

FINANCE 530

### Technical Analysis and Trading

This is a hands-on course that teaches principles and methods of selecting and managing stocks using professional trading software. Theoretical concepts and trading principles will be taught throughout the course and students will manage an e-portfolio in real-time with imaginary funds. Prerequisites: FIN 400 and completion of all required Finance concentration courses or concurrent registration in final required concentration courses.

3 semester credits

FINANCE 540

### Financial Analysis and Modeling

This course introduces important financial models and shows how they can be solved numerically and/or simulated using computer technology (e.g. Excel). This class covers standard financial models in the areas of corporate finance, financial statement simulation, accounting model, portfolio problems, options, portfolio insurance, duration, and immunization. It will give tools for understanding the computational intricacies in finance. Too often, finance courses stop short of making a connection between textbook finance and the problems of real-world business. This course bridges this gap between theory and practice by providing a nuts-and-bolts guide to solv-

ing common financial and accounting models with spreadsheets. Prerequisites: FIN 400 and completion of all required Finance concentration courses or concurrent registration in final required concentration courses.

3 semester credits

FINANCE 545

### Financial Derivatives and Risk Management

This course covers financial derivatives such as forward contracts, futures contracts, options and swaps. A derivative is a financial instrument that is derived from the value of an underlying asset. The underlying asset can be commodities, equities, bonds, foreign exchange, or indices such as a stock market index, consumer price index or even an index of weather conditions. These derivatives can not only be used for speculation and arbitrage, but more importantly, can also be used for risk management. Students will develop a working knowledge of how these derivatives are used and how they are priced. Prerequisites: FIN 400 and completion of all core courses or concurrent registration in final core courses.

3 semester credits

FINANCE 550

### Cases in Finance

The focus of this course is the application of managerial finance principles (from FIN400: Financial Management) to the financial decisions made by business. The purpose is to develop student analytical ability through the discussion and analysis of finance cases. Topics covered include financial concepts and planning; valuation, rates of return and leverage; cost of capital; dividend policy; sources and uses of investment and working capital; and international finance. Prerequisites: FIN 400 and completion of all core courses or concurrent registration in final core courses. For the Global Financial Services concentration, this course should be taken as the final required Global Financial Services course.

3 semester credits

FINANCE 555

### Management of Financial Institutions

This course covers the management of financial institutions (FIs), including depository institutions such as commercial banks and savings institutions, insurance companies, securities firms and investment banks, mutual funds, and finance companies. The focus is on risk measurement and management facing these FIs. The roles and operations of financial markets and various financial instruments and the impact of interest rates on the economy will also be discussed. Prerequisites: FIN 400 and

## Finance • Global Development and Peace

completion of all required Finance concentration courses or concurrent registration in final required concentration courses.

*3 semester credits*

FINANCE 570

### **Managerial Economics**

Managerial economics deals with the application of economic theories to real-world business decisions. A course in managerial economics provides students with the fundamental analytical tools that can and should be used in marketing, finance, production, and strategic management. Managerial economic techniques seek to achieve the objectives of the business organization in the most efficient manner, while considering both explicit and implicit constraints on achieving the objectives. Some basic quantitative skills such as statistics and calculus are required. Prerequisites: ECON 400, MGMT 400, FIN 400 and completion of all core courses or concurrent registration in final core courses. This course may be taken as an elective with required Finance and Management concentration courses.

*3 semester credits*

FINANCE 525

### **International Financial Management**

This is an advanced course in international financial management. It will cover various aspects of financial management of multinational enterprises (MNEs), including the foreign exchange market, currency derivatives, global financial markets, international portfolio investment, cross-border direct investment, and foreign exchange and interest rate risk management. Prerequisites: FIN 600 and completion of all required Finance concentration courses or concurrent registration in final required concentration courses. Prerequisites for International Business: FIN 600 and completion of all core courses or concurrent registration in final core courses.

*3 semester credits*

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## **Global Development and Peace**

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GLOBAL DEVELOPMENT AND PEACE 500

### **Graduate Co-op/Internship in Global Development and Peace**

Students may complete a curricular practical training that reflects the competencies that the students has developed in the Global Development and Peace program. Students need to have their supervisor in the training certify satisfactory task performance and stu-

dents must submit a written evaluation of their experience.

*1-3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 501

### **Research Methods**

This is an introductory course in qualitative and quantitative research methods. It is designed to introduce you to basic concepts and issues encountered in research investigation. We will discuss what research is, the tools of research, research design, and writing the research report. Included will be an introduction to a diversity of research methods, including survey, historical research, participant and non-participant observation, experimental design, and content analysis. An overview of statistical means of data interpretation also will be presented, including correlations, t-tests, chi-square tests, and so forth. Legal and ethical issues related to research, including research with human subjects, will be examined.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 511

### **Issues in Economic Development**

Course Description: This course explores current issues in economic development including poverty and poverty alleviation, strategies to overcome poverty and underdevelopment including microfinance, the roles of multilateral financial institutions, globalization, and the Washington Consensus. The course will also explore the roles of regional arrangements and development institutions in attempts to overcome underdevelopment. The theoretical underpinning of the course lies in the many schools of thought that have produced explanations of the causes and consequences of development and underdevelopment. The course attempts to plot strategies to achieve goals of economic development.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 521

### **Inequality, Poverty and Globalization**

This course examines two key issues for the international community in an era of globalization: inequality and poverty. Various theoretical, historical and empirical approaches will be used in analyzing the causes and consequences of inequality and poverty for the developing world. Students are also encouraged to develop economic, political, cultural, and social solutions to the chronic issues of poverty and inequality in the world.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 522

### **International Conflict Negotiation**

This course examines theories about and sources of conflict (resource allocation and shortage; ideological, religious, and cultural disagreement; power distribution; perceptions of security; etc) to set the stage for conflict analysis and negotiation. In conflict analysis, the impact of cultural-linguistic systems on agreements and disagreements is examined. Culturally sensitive strategies of negotiation, conflict resolution, and mediation also are examined and practiced. Students will write several case reports on situations of conflict and also prepare a medium-length (20 pp. or so) term paper.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 523

### **Corruption**

This course introduces students to corruption – definition, causes, practice, and consequences. It seeks to inquire into the economic, political and human costs of corruption, and the role of corruption in weak or malgovernance. The course also seeks to inquire into role of corruption in state collapse and state failure.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 524

### **Political and Economic Integration**

This course explores models of integration – functionalism, customs union, political integration, and federalism. Dual legislative systems are examined as instruments of harmonization of laws, and the roles of secretariats as vehicles of transition are explored. The course considers historical and contemporary models including the Federation of the West Indies, and the European Union. The course examines shortcomings of, and successful attempts at, political and economic integration.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 525

### **Globalization, Peace and Conflict**

This course will examine the many meanings of globalization: economic, political, social, and cultural and explore how these global transformations are altering dynamics of peacemaking and conflict at both the international and domestic levels. Among other topics, the course will examine the relationship between economic integration and war and civil war; economic integration and political conflict; cultural conflict; ethnic conflict; conflict and gender; and new technologies and conflict. This course also examines the key concepts, themes, theories, and practices involved in peace psychology and the role it plays in peacemaking at a global and local level. Students will be introduced to the issues of peace

## Global Development and Peace • Health Sciences

and conflict across a wide range of interpersonal, community, national and international contexts. In particular, the course will explore when and under what conditions globalization processes may promote peace and under what circumstances they may aggravate old conflicts and lead to the emergence of new ones.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 528

### **Sociopolitical Implications of World Religions**

Sociopolitical interaction between civilizations as defined by their religious cultures will be considered from a historical and contemporary perspective, with an emphasis on the latter. This course will explore practical implications for GLDP professionals in their work in other cultures and societies. It will do so by focusing primarily on the specific features of Christian, Muslim, and Far Eastern Confucian societies and their implications in world affairs. Beyond the discovery of data, their analysis and their evaluation, this course will attempt to answer questions such as: to what extent do current clashes between the above (and other) societies have a potential for resolution, and what avenues can be suggested? Is secularization destined to remain a typically Western and Christian phenomenon or is it the inevitable destiny of all cultures? Is religious universalism necessarily a Western particularism wrongly coded as universal? In considering these and other questions, the course will evaluate different competing models, in particular the views of Samuel Huntington and its critics, as well as the vision expressed in Kant's Perpetual Peace and its impact on the creation of the United Nations.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 529

### **Political Economy of Migration**

This course explores the constants and variables of immigration. The course will also consider the extent to which overseas investment in less developed countries and the strengthening of regional customs unions and the WTO will affect immigration trends. Due to the gap in the quality of life in developed versus less developed countries as well as the ongoing demand for cheap, unskilled labor, the number of immigrants to the developed world continues to grow in the United States and in the European Union. This Course also invites learners to assess how the growing demographic of immigrants and their children may affect voting patterns, public education, and the foreign policy priorities of the developed societies where they tend to settle.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 533

### **Cultural Dimensions of Globalization**

While recognizing that a developing consensus exists on economic globalization, this course explores the broader cultural and philosophical implications of globalization. Extending beyond economic globalization to the social, political and cultural dimensions, one must indeed explore the substance of what is being "globalized" in each of these aspects of public life. This course invites learners to grapple with the question of whether or not the world is ready to implement an expanded globalization or whether a "dialogue among civilizations" is a necessary intermediary step in the process.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 537

### **Global Communication and Mass Media**

This course examines media's role in global communication and nation building. In particular, it studies information flow, media and development, communication and telecommunication policies, transnational media corporations and their role in economic development, media and public diplomacy, international journalism, and information and public campaigns.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 540

### **Culture and Development**

The course will examine development theory and the underlying cultural assumptions of Western models of socioeconomic development. It will also study the innovative non- Western models of development such as micro-credit in South Asian and the Confucian- influenced models of development in parts of East and Southeast Asia. This course will identify the ways in which Western cultural assumptions can clash with the cultural underpinnings of many less developed countries. Using the case study method, learners will identify ways in which potential clashes are anticipated based on a region's history and its cultural underpinnings. Learners will assess the strategies currently used to address development-related challenges and, when appropriate, propose alternative strategies.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 543

### **Media and National Development**

The focus of this course is on communication and national development and nation-building. Students will learn how media, communication, and information can be used

to improve economic, political, and cultural conditions of people around the world. In particular, the course will look into the functions media communication and social marketing demonstrate in reducing poverty, combating hunger, improving literacy, promoting public health care, fighting corruption, and protecting the environment among others.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 550

### **Advanced International Journalism**

This course focuses on how international news is covered and how to cover international news. It also examines the issue of news media and foreign relations.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 560

### **Sustainable Development**

This course examines challenges related to balancing the fulfillment of human needs with protecting the environment, taking into account economic, social, and ecological factors. Among topics discussed are global macro-trends, environmental actors (states, NGOs, etc.), international law, environmental regimes, natural resources, biodiversity, global political economy, alternative and renewable energy, climate change, petroleum, air pollution, hazardous chemicals, and wetlands. Case studies will be used to highlight the challenges faced by the development process due to the social, economic, and quality of life demands of growing populations in less developed countries vis-à-vis the need to preserve and maintain the environment and endangered ecosystems. Prerequisites: GLDP 511 or 528.

*3 Semester Hours*

GLOBAL DEVELOPMENT AND PEACE 563

### **International Human Rights**

This course is intended for graduate students and the enthusiasts in international affairs and human rights. It explores the concept of human rights and state responsibilities; the realm of national and international responsibilities; and international human rights as obligations. The course seeks to convey to the student the breadth and depth of the discourse since the end of the Second World War, in particular the transition from declarations about the rights of peoples to the affirmation of criminal responsibility by the international community from the Nuremberg Tribunal and Tokyo Trials to the International Criminal Court at the Hague. All this is placed in the wider context of development, and seeks a balance between the broader discourse of political and economic rights.

## Global Development and Peace • Health Sciences

### 3 Semester Hours

GLOBAL DEVELOPMENT AND PEACE 581

#### Advanced Diplomacy

The course builds upon the skills and competences acquired in foundation courses in the Global Development and Peace program, in particular GLDP 522 International Conflict Negotiation. Students will develop enhanced competencies in the areas of diplomacy and related negotiations, principles and practices of diplomacy, in particular in the context of foreign policy of the United States. Prerequisite: GLDP 522 or instructor's permission.

### 3 Semester Hours

GLOBAL DEVELOPMENT AND PEACE 591

#### Internship

Students will complete an eight-week cross-cultural internship with international organization or overseas school, agency or company. A written report by the student and an assessment of the Student's performance by the agency where the student interns will be submitted as the basis of evaluation. Prerequisite: completion of 18 credits.

### 3 semester hours

GLOBAL DEVELOPMENT AND PEACE 598

#### Tutorial

The tutorial is offered at the completion of the internship. The tutorial invites students in the Master of Arts in Global Development and Peace program to reflect on their internship experience based on the student's experiences prior to and during the tutorial. The tutorial also prepares students for the program's comprehensive exam that includes both an oral and a written component and is conducted in the final weeks of the tutorial class. As a part of the tutorial students also assemble a portfolio of all of the major papers and projects that they have completed during the program and a written reflection on that work. Prerequisite courses: GLDP 591 and completion of at least 21 semesters hours of the GLDP program.

GLOBAL DEVELOPMENT AND PEACE 599

#### Thesis

As a final project demonstrating competency, students are asked to write and defend a thesis.

### 3 semester hours

GLOBAL DEVELOPMENT AND PEACE 600

#### Thesis Extension

### 1 semester hour

The following courses taught by the School of Business also are available to Global Peace and Development students. Full course descriptions are available under the primary

course listings.

MGMT 561

#### Economic, Regulatory, Political, Cultural and Societal Issues in Environmental and Energy Management

MGMT 560

#### Foundations of Environmental and Energy Management

MKTG 560

#### Global Market Management

FIN 525

#### International Financial Management

FIN 530

#### Technical Analysis & Trading

MGMT 555

#### Global Program and Project Management

MGMT 534

#### Strategic Sourcing and Vendor Management

MGMT 523

#### Leadership, Teams & Managing Change

MKTG 560

#### Global Market Management

MKTG 535

#### e-Marketing

MGMT 585

#### Product Management, Innovation and Commercialization

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## Health Sciences

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HSCI 710

#### Introduction to the U.S. Health Care System (Core course)

This course is a broad survey of the various components of the U.S. health system, emphasizing the historical development of the various institutions which make up the system, and financial analysis of those institutions as they currently exist. This class will not address health care systems of countries outside the U.S. This course will include the status and implementation of the new reform legislation at the state and federal levels and to the budgetary implications of health care spending more broadly. There will also be a focus on the major health policy institutions and important issues that cut across institutions, including private insurers and the federal/state financing programs (Medicare and Medicaid/SCHIP). Attention also will be given to mental health issues, disparities in access to care, the quality of care, structure of the delivery system, the challenges of long-term care and the aging of the population, and the drivers of cost growth.

### 3 Credits

HSCI 715

#### Research Methods for the Health Sciences (Core course)

A comprehensive exploration of research methods used in the health sciences, with an emphasis on selecting and applying appropriate research designs. This course includes an overview of the scientific method and the various research paradigms in current use; research ethics and the protection of human subjects; the role of theory in problem formulation; internal and external validity; variable measurement and reliability, and generalizability of findings. Specific approaches covered include experimental and quasi-experimental treatment designs, epidemiologic methods (cohort and case-control studies), survey research, evaluation and outcomes research, methodological studies and qualitative research.

### 3 Credits

HSCI 720

#### Global Health Issues (Core course)

This course examines contemporary issues in global health policy, delivery and discusses major global health challenges. Students will be introduced to the world's vast diversity of determinants of health and disease. Students will analyze current and emerging global health priorities, including emerging infectious diseases, poverty, conflicts and emergencies. The course will also review health inequity, health systems reforms, and major global initiatives for disease prevention and health promotion. The course will consider how inequalities in education, income, and occupation influence health status. The public policy process will be explored using a variety of contemporary global health case studies which focus on content areas such as maternal health, HIV policy, refugee health and global healthcare delivery. The course will also examine the global health workforce and the impact of widespread global migration of health professionals on receiving and sending countries.

### 3 Credits

HSCI 725

#### Fundamentals of Clinical Trials (Core course)

This course is designed to teach the fundamentals of a good clinical trial in the evaluation of a new drug or device, be it industry, federal or philanthropic sponsored. This course begins with the evaluation process leading up to human volunteer trials, through elements in designing a trial, writing the scientific protocol, considering regulatory issues and human subjects' protection, through elements in protocol development/implementation, and quality assurance.

## Health Sciences

3 Credits

HSCI 730

### **Healthcare Informatics (Core course)**

This course is designed to explore the healthcare information technology (IT) planning and management issues associated with decision making in healthcare organizations. IT provides a framework to understand the types of information systems prevalent in healthcare organizations, evaluate specific strategies related to healthcare IT investments, and understand the ramifications of health data standards and privacy concerns on information management policy. In this course, students will learn how the core competencies of healthcare informatics can be developed and applied using real-world case studies. Students will be exposed to specific concepts related to electronic medical records (EMR), health data and standards, sourcing, and IT investments in healthcare. Upon completion of the course, students should be able to explain the key information requirements for effective health information management and decision support, plan and develop the governance and oversight requirements of healthcare IT projects, understand the specification and selection process of healthcare projects, and apply these competencies to real-world problems.

3 Credits

HSCI 735

### **Data Analysis and Interpretation (Core course)**

This course covers the selection, application and interpretation of basic statistical tests and procedures used in the health sciences. Topics include data and variables, hypothesis testing, confidence intervals, t test, Fischer's F test and the one way Analysis of Variance (ANOVA).

3 Credits

HSCI 840

### **Advanced Disease Processes and Treatment (Clinical concentration)**

This is an advanced course providing detailed information about systems physiology and pathophysiology, as well as the epidemiology, etiology, risk factors, pathogenesis, prognosis and treatment of disease, particularly pharmacotherapeutics. Topics covered include cardiopulmonary diseases, infectious diseases, gastroenterology, urology, endocrine and oncology. Lab and specific diagnostic tests will be reviewed. Cultural and ethnic approaches to health care and prescription drug use will also be explored. Special attention will be placed on recognizing drug-drug, drug-nutrient, and drug-exercise interactions.

3 Credits

HSCI 845

### **Lifestyle and Health Issues (Clinical concentration)**

Crucial health issues with an emphasis on the relationship between lifestyle and health. The course enables students to deal more effectively with the health problems faced throughout life. These issues may include stress, sexuality, nutrition, mental health and illness, aging, chronic and communicable disease, drug and alcohol use, and dealing with death, and other selected topics.

3 Credits

HSCI 848

### **Teaching in the Health Professions (Education concentration)**

This course provides an analytic and developmental approach to the roles and functions of the health professional teacher. Discussions will focus on teaching roles, style and philosophy and the application of learning theory to instructional design and lesson planning. Emphasis will be on selection and application of appropriate teaching strategies and assessment methods according to the goal(s) of instruction and identified learner characteristics. Other issues that will be addressed are student problem management, key ethical and legal responsibilities, and the incorporation of research evidence into teaching practice.

3 Credits

HSCI 849

### **Educational Assessment (Education concentration)**

This course reviews the types, purposes, procedures, uses, and limitations of assessment strategies and techniques. The use of standardized testing and implications for current practice is also discussed. Topics such as creating and using assessment tools that improve instruction (formative assessments) as well as gauge its success (summative assessments) will be reviewed. Learning to design assessments that are carefully aligned with educational objectives is another component of this assessment course. This course will explore aspects of developing objective and subjective exams. Another topic involves the methods of developing and revising assessment tools such as rubrics, checklists, and scoring guides.

3 Credits

HSCI 850

### **Health Promotion and Disease Prevention (Clinical concentration)**

This course provides an overview of the major

issues in health promotion and disease prevention. This course will explore the possible association between nutritional status and premature mortality and morbidity. Strategies for risk reduction and the development and implementation of interventions will be presented. Emphasis will be placed on understanding the role nutrition plays not only in health but also in disease prevention.

3 Credits

HSCI 851

### **Advanced Clinical Nutrition I**

Integrative nutrition and functional medicine in Metabolic Health Issues and Cardio Vascular Health (Metabolic Syndrome, Obesity, Weight Loss Resistance, Diabetes Mellitus, Diabesity, Non - Alcoholic Fatty Liver Disease, Liver Disease, Hypertension, CVD, CHD, Arrhythmia, Vascular Health, Hyperlipidemia, Gastric Bypass Surgery, Hypothyroidism, Hashimoto's Thyroiditis, Graves' Disease and other Endocrine Disorders). Critical assessment and evaluation of current Evidence Based Nutrition (EBN) and other interventions: Low Glycemic Index and Glycemic Load Diets, DASH Diet, Vegetarian Diet, Ketogenic Diet, Fruitarian, Paleo Diet, Whole 30 Diet, Elimination Diets, IFM Intermittent Fasting and Mitochondrial Diet, IFM Cardiometabolic Diet, and all weight loss and FAD diets as they pertain to Metabolic Health Issues and the potential dangers of them. Supplementation EBN evaluation, assessment and dosing for condition specific application.

3 Credits

HSCI 852

### **Advanced Clinical Nutrition II**

Integrative nutrition and functional medicine in cardiovascular health (heart disease, congestive heart failure, arrhythmia, dyslipidemia, hypertension, vascular health, anemia).

3 Credits

HSCI 853

### **Advanced Clinical Nutrition III**

Integrative nutrition and functional medicine in Metabolic Health issues (Metabolic syndrome obesity, chronic fatigue syndrome, diabetes mellitus, and other endocrine disorders).

3 Credits

HSCI 854

### **Advanced Clinical Nutrition IV**

Integrative nutrition and functional medicine in chronic and degenerative diseases, neurological disorders, immune dysfunction, osteoarthritis, chronic inflammation, allergies, cancer.

## Health Sciences

3 Credits

HSCI 855

### **Integrative and Complementary Medicine (Clinical concentration)**

This course will provide students with a working knowledge about integrative and complementary medicine and clinical applications for patient/client care and research. Federal regulations, cultural beliefs, scientific research and perceived benefits and risks will be explored. The appropriateness of integrating these therapeutic modalities into conventional medicine will also be explored.

3 Credits

HSCI 858

### **Curriculum and Syllabus Development in Higher Education (Education concentration)**

This course will explore the various types of curricula that exist within organizations as well as goals and philosophical orientations to education. The course is designed to provide students with the knowledge and skills to fulfill leadership positions as enlightened educators. Students will gain a broad understanding of the curriculum development process. Topics will include translation of societal and community expectations into theoretical curricular frameworks for application to problem solving and initiatives for change. Discussions will revolve around what knowledge is most worth learning, why it is worthwhile, and how it will be delivered. Topics will include the effect of internal and external forces on the curriculum. The course will also cover creation of syllabi with a description of the required components.

3 Credits

HSCI 859

### **Pedagogy and Teaching Strategies for College Instructors (Education concentration)**

This course describes the theoretical basis of pedagogy and explores the foundations of teaching in higher education. Issues such as: how students learn, motivating students, and matching teaching methods with learning outcomes are topics designed to improve the quality of higher education. This course not only covers how to connect with students in the learning process, but also how to determine if students are learning. Using active techniques, encouraging classroom participation, motivating students, and various learning styles are examples of topics that will be covered. This course provides practical suggestions to implement the methods discussed.

3 Credits

HSCI 860

### **Evidence-Based Practice (EBP) (Elective)**

This course introduces practitioners to principles of evidence-based practice (EBP), policy, practice guidelines, and information utilization for practice modeling. Increasingly, health care practitioners are presented with new information about recent findings from research and professional consensus statements regarding best-practices and practice guidelines. This course focuses on preparing students to engage in evidence-based practice, providing the skills needed to critically evaluate new information that is available from research findings and professional consensus statements. Furthermore, the course provides skills for integrating this new information into the students own, personalized approach to practice.

3 Credits

HSCI 865

### **Principles of Health Policy and Management (Elective)**

This course discusses the general principles of planning, management, evaluation, and behavior of public and private health care organizations at the local, state and national levels. The course examines the organization, financing, and delivery of public health and personal health services, with emphasis on major current health policy and management issues related to access, quality and cost.

3 Credits

HSCI 870

### **Principles of Environmental Toxicology (Elective)**

Environmental toxicology is the study of the nature, properties, effects and detection of toxic substances in the environment and in any environmentally exposed species, including humans. This course will provide a general understanding of toxicology related to the environment. Fundamental toxicological concepts will be covered including dose response relationships, absorption of toxicants, distribution and storage of toxicants, biotransformation and elimination of toxicants, target organ toxicity and teratogenesis, mutagenesis, carcinogenesis and risk assessment. The course will include an overview of chemodynamics of contaminants in the environment including fate and transport. The course will examine chemicals of environmental interest and how they are tested and regulated.

3 Credits

HSCI 875

### **Infectious Diseases (Elective)**

This course provides a detailed examination of emerging and reemerging infectious disease, focusing on significant illnesses found in

various regions of the world. Topics include information on the underlying mechanisms of microbial emergence, the technology used to detect them, and the strategies available to contain them. Discussion will involve diseases and their causative agents that are major factors in the health of populations the world over. This course will provide a clear understanding of factors associated with disease emergence and re-emergence can help medical and public health professionals to identify, study, and control new and renewed epidemics and outbreaks. Epidemiological characteristics such as incubation period, infectious period, and means of transmission, the immune response, treatment, prevention and surveillance of these infectious diseases will be evaluated. Up-to-date selections from infectious disease journals as well as information from the Centers for Disease Control and Prevention, the World Health Organization, MedLine Plus, and the American Society for Microbiology will be included to insure that topics are kept current.

3 Credits

HSCI 888

### **Medical Toxicology (Elective)**

This course covers the adverse health effects of exposure to drugs or substances of abuse. The principles of toxicodynamics, toxicokinetics, biotransformation, diagnosis and treatment will be discussed. Emphasis will be placed on mechanism(s) of action of the various drug classes, body system(s) affected, clinical manifestations of problems and the resulting adverse effects on human health and society. Methods of treatment and client education will also be addressed. Laws controlling and governing the use of these drugs/substances and the agencies responsible for them will also be covered.

3 Credits

HSCI 889

### **Comparative Health Systems (Elective)**

This course examines health systems from a comparative perspective in order to understand how various countries address similar problems. This course begins by discussing global health themes, including: international health organizations, right to health, access to medicines, significant international health issues, women's health, children's health, and the environment and health. The course includes a discussion of the different approaches and methods used in comparative health care systems and examine some of the key concepts that will allow for meaningful policy comparisons across countries. The course

## Health Sciences • Global Media and Communication Studies

explores what healthcare systems do and how they have evolved. Different frameworks for healthcare delivery, financing, coverage, and allocation of resources are examined. Students will learn to analyze the advantages and disadvantages of various ways of organizing and financing health care and to evaluate health policies according to a range of criteria for cost, quality and equity. The focus will be on select health care systems around the globe and review the structure and functioning of their health systems.

*3 Credits*

HSCI 890

### **Dissertation Seminar (Required)**

This course is designed as a general seminar for all doctoral students in the D.H.Sc. Program. This seminar does not focus on a specific content area but instead is designed to provide students with an overview of the requirements for completing a doctoral dissertation, and provide a forum for discussing dissertation-related concerns and issues with other students. In particular, the seminar emphasizes the development of the conceptual and research skills necessary for the completion of the doctoral dissertation, including the formulation of the dissertation proposal (selection of an area and topic, formulation of appropriate research questions/hypotheses, rationales etc.), the development of the skills necessary for identifying and critically evaluating published research relevant to the chosen dissertation topic, as well as an appropriate research methodology for empirically evaluating the hypotheses proposed. Designed in a seminar format, this course guides students through the formative stages of proposal development in which constant, critical thinking is required. Interaction among the instructor and students is important to transform ideas into a doctoral dissertation project. Must complete all coursework before registering HSCI 890. HSCI 891 must be registered with this course in the same term. Prerequisite: completion of 48 credits of HSCI.

*3 Credits*

HSCI 891

### **Dissertation I (Required)**

This course is designed to synthesize the knowledge and skills developed in previous research courses and apply them to the doctoral dissertation process. Students learn about all aspects of the process of developing and carrying out the doctoral dissertation, and they gain an understanding of standards and expectations that students need to meet to be suc-

cessful in completing the dissertation process. Throughout the course, students are required to work closely with their dissertation advisor, as appropriate. Student performance in the course will be assessed by their advisor. To make substantial progress, it is essential that students set and meet goals and have regular contact with their advisor to ensure the dissertation is progressing in a focused and high quality manner. Students will also prepare a dissertation proposal presentation. The course concludes with scholarly discussions and critique of peer presentations. Prerequisite: take with HSCI 890.

*3 Credits*

HSCI 892

### **Dissertation II (Required)**

This course focuses on the completion of the doctoral dissertation. Emphasis is placed on understanding and defining the logical relations between elements in a proposal including the problem statement, conceptual/theoretical framework, literature review, research design and methodology. Students will work closely with their advisor throughout this process. Prerequisite: HSCI 891.

*3 Credits*

HSCI 895

### **On Campus Seminar (Required)**

An intensive one week on campus seminar is the culmination of the Doctor of Health Sciences degree program. This seminar will provide students with a unique on-campus learning experience. Health care professionals who are established and leaders in their fields will be recruited as guest lecturers. In addition to the lectures, students will have the opportunity to hone their skills by attending workshops led by experienced clinicians. Topics such as improving patient care and interviewing techniques will be featured. Finally, students will be required to present their dissertations and submit a report of their experiences at the seminar. Prerequisite: HSCI 892.

*3 Credits*

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## **Global Media and Communication Studies**

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GLOBAL MEDIA AND COMMUNICATION STUDIES 500

### **Graduate Co-op/Internship in Global Media & Communications**

Students may complete a curricular practical training that reflects the competencies that the students has developed in the Global Media

and Communication Studies program. Students need to have their supervisor the training certify satisfactory task performance and students must submit a written evaluation of their experience.

*1-3 semester hours*

GLOBAL MEDIA AND COMMUNICATION STUDIES/GLDP 501

### **Graduate Seminar in Research Methods**

This is an introductory course in qualitative and quantitative research methods. It is designed to introduce you to basic concepts and issues (statistical, analytical, and ethical) encountered in research investigation. We will discuss what research is, the tools of research, research design, and writing the research report. Included will be an introduction to a diversity of research methods, including survey, historical research, experimental methods, content analysis, and so forth. An overview of statistical means of data interpretation also will be presented, including correlation, t-tests, ANOVA, ChiSquare Test, Sign Test, regression analysis, and so forth.

*3 semester hours*

GLOBAL MEDIA AND COMMUNICATION STUDIES 511

### **Communication Theories**

This course focuses on communication theories. Major communication theories in the areas of information processing, persuasion, influence, decision-making, conflict resolution, group communication, intercultural communication, organizational communication, media communication, new media communication, social media and culture, media effects, and public opinion will be studied.

*3 semester hours*

GLOBAL MEDIA AND COMMUNICATION STUDIES/GLDP 522

### **Conflict Analysis and Resolution/International Conflict and Negotiation**

This course examines theories about and sources of conflict (resource allocation and shortage; ideological, religious, and cultural disagreement; power distribution; perceptions of security; etc) to set the stage for conflict analysis and negotiation. In conflict analysis, the impact of cultural-linguistic systems on agreements and disagreements is examined. Culturally sensitive strategies of negotiation, conflict resolution, and mediation also are examined and practiced.

*3 semester hours*

GLOBAL MEDIA AND COMMUNICATION STUDIES/GLDP 528

### **Sociopolitical Implications of World Religions**

This course identifies the underlying conditions needed for the realization of a stable global economy and it highlights the ways

## Global Media and Communication Studies • Information Systems and Knowledge Management

in which terrorism impacts on the stability of markets and on investment and lending trends and on interest rates in affected regions and stages. The course also explores the “practical: rationale for terrorism as well as terrorism ideological and philosophical roots as well as the actual historical trajectory of terrorist organization and states. Through the case study method, we will review those venues where terrorism has been diffused and attempt to understand such developments and their applications to contemporary society.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES/GLDP 529 **Advanced Intercultural Communication**

This course studies different cultures around the world. In particular, it examines value systems, gender roles, and family structures. It will also examine the relationship between culture and religion, culture and economic development, culture and media, culture and new media, and culture and human development.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 533 **Cyber War and Security**

This course views computer security as a strategic concept, not a technical discipline. The world's booming dependence on the powerful yet vulnerable Internet—combined with the growing capabilities of cyber attackers—currently jeopardizes national and international security. Strategic challenges projected by state and non-state actors present in the cyberspace require relevant strategic knowledge, thinking, and solutions.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 535 **International Advertising and Public Relations**

This course focuses on the theoretical and practical aspects of international advertising and public relations. In particular, it examines the characteristics, problems, and challenges in the areas of international advertising and public relations. It also studies how media and new media are used for advertising and public relations in an international setting. Business, economic, cultural, social, and political factors will be analyzed in the context of international advertising and public relations.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES/GLDP 537 **Global Communication and Mass Media**

Critical study and applications of theories and principles of global communication and

mass media. Analysis of the roles traditional media, new media, and media professionals play in politics, governance, and international relations. Examination of how media systems work in different countries, how journalists cover news and events, how information flows globally, and what impact information flow creates to countries and peoples around the world.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES/GLDP 543 **Communication and National Development**

The focus of this course is on communication and national development and nation building. Students will learn how media, communication, information, and media technology are used and can be used to improve economic, political, and cultural conditions of people around the world. In particular, the course will look into the functions media communication, social media networking, and social marketing demonstrate in reducing poverty, combating hunger, improving literacy, promoting public health care, fighting corruption, and protecting the environment among others.

### GLOBAL MEDIA AND COMMUNICATION STUDIES 546 **New Media and Information Management**

This course examines media industry from business and management perspectives. It focuses on business concepts, media management theories, and the impact of digital media on the media industry landscape.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 552 **Advanced Web Publishing and Design**

This course focuses on Web Publishing and Design methods using current Web design and graphic tools. Students will learn the techniques and tools to create Web sites and learn to maintain the Web sites for clients and consumers.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 555 **News Media and International Journalism**

This course focuses on how international news is gathered and reported and how journalists should cover international news. The course also examines the issues of international news media and foreign relations.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 557 **Political Communication and Public Diplomacy**

This course focuses on the relationship between media and politics and media and public diplomacy. It will also examine the issues of freedom of speech and freedom of

the press, media as mouthpiece or watchdog. The course will also study how media are used in governance, how public opinion is formed, shaped, and influenced, how political and public agenda are set, and how media can be used for public diplomacy.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 562 **Media Communication Law and Legal Issues**

This course examines the federal, state, and local laws that most directly affect mass communication in the United States. It will also look into the judicial systems in other countries. Issues covered will include freedom of speech, freedom of the press, libel, invasion of privacy, news gathering, source protection, copyright, and truth in advertisements.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 572 **Advanced Multimedia**

This course focuses on advanced multimedia technology and techniques. Students will learn the most current tools, software, and techniques to create and edit multimedia digital videos to be used for multiple mediums and platforms.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 591 **Internship**

The Graduate Internship is completed once the student has completed 18 credits in the GMCS program. It serves as the venue in which students can accomplish two important outcomes, i.e., they can apply the foreign language that they have been studying in an overseas setting (international GMCS students may do their internship in the US if they already speak a second world language in their home country rather than English) and they can intern in an agency or organization where the skills that they have acquired in the GMCS academic program can be put into practice. New Media students will be expected to complete a project or portfolio, which demonstrates their ability to communicate cross-culturally in the New Media environment. Global Communications students will produce a project demonstrating the ability to communicate interculturality in a business, government or NGO setting. Prerequisite: completion of 18 credits.

*3 semester hours*

### GLOBAL MEDIA AND COMMUNICATION STUDIES 599 **Tutorial**

The tutorial is offered at the completion of the internship. The tutorial invites students in the Master of Arts in Global Media and Com-

# Global Media and Communication Studies • Information Systems and Knowledge Management • Management

munication Studies program to reflect on their internship experience based on the student's experiences prior to and during the tutorial. The tutorial also prepares students for the program's comprehensive exam that includes both an oral and a written component and is conducted in the final weeks of the tutorial class. As a part of the tutorial students also assemble a portfolio of all of the major papers and projects that they have completed during the program and a written reflection on that work. Prerequisite courses: GMCS 591 and completion of at least 21 semester hours of the GMCS program.

*3 semester hours*

GLOBAL MEDIA AND COMMUNICATION STUDIES 599

## Thesis

The thesis represents the culmination of the MA in Global Media and Communication Studies and demonstrates competency in the major as well as the track in which the student has chosen to specialize. The Thesis requires identifying a theme or topic selected by the student in consultation with the thesis adviser and this is followed by detailed research on the topic and the analysis of findings in the form of substantial written work. This is normally done within the confines of the student's final semester of study in the program.

*3 semester hours*

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## Information Systems and Knowledge Management

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INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT 400

### Information Systems and Technology

Information technology has become a key component for accomplishing strategic and operational goals in organizations today. As such, organizations expect their new employees to have a basic understanding of information technologies. To accomplish organizational goals and advance one's career path, one needs to understand and apply information technologies effectively, efficiently, and creatively. The purpose of this course is to provide an introduction to information systems and technology and to familiarize students with the fundamental concepts and principles of information systems. The course is targeted for graduate students who have little or no background in information systems. Therefore, it focuses on breadth of coverage rather than depth in any specific area. Prerequisites: Admission to graduate study.

*3 semester credits*

INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT 505

### Knowledge Management and Business Intelligence

This course will explore various issues of creating, storing, sharing and applying knowledge in organizational environment. The course introduces guiding theories and concepts of knowledge management and examines various tools used in the processes. Then the course also explores business and management topics in knowledge management, including general issues in evaluating informal systems like knowledge management systems and the relationship of knowledge management to the work, etc. Prerequisites: ITKM 505 and completion of all core courses or concurrent registration in final core courses.

*3 semester credits*

INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT 548

### Enterprise Intelligence & Decision Support System

If information is business' lifeblood then enterprise intelligence (referred to as "business intelligence" and "BI" for the remainder of this document) is its beating heart, ensuring actionable information reaches everyone who needs it throughout the enterprise. With business analytics, big data and cloud BI exploding in the marketplace professionals should understand BI to help their enterprises harness the power of their data. This course provides that understanding. Additional topics and cases are added to complement the text, written for managers grappling with how to leverage their enterprise data for positive results.

*3 semester credits*

INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT 549

### Technical Concepts for Analytics Professionals

Success requires knowledge of your functional area and mastery of the data that fuels it. This course provides the technical understanding and critical thinking skills needed to adopt, learn and apply relevant tools and techniques to analyze data with confidence. Students will gain hands on experience with structured query language (SQL) and R, from an applied perspective. In addition, they will be exposed to database, programming, analytics and statistical concepts. They will emerge ready to engage in additional study or to secure jobs in the marketplace that require these skills.

*3 semester credits*

INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT 500

### Information Technology & Quantitative Methods

Data preparation and cleaning, data analysis, and data visualization are now at the heart of managerial decision making. This course will

illustrate both IT and Quantitative Methods through three fairly involved examples and extensive hands-on experience. Cleaning data will lead us to database principles that underlie data independence and referential integrity. Summarizing a modest-sized dataset (about 8,000 rows) will introduce statistical summaries, some basic visualization tools, and the statistics behind correlation coefficients and matrices. Pivot Tables and various visualization techniques will allow us to answer the question, "What is the data telling us?" The final project allow us to apply results from calculus to generate forecasts which we will then visually and statistically compare by using 3-D graphics and hypothesis testing. We will use the computer for the entire course; nothing is done by hand.

*3 semester credits*

INFORMATION SYSTEMS AND KNOWLEDGE MANAGEMENT 560

### Foundations in Advanced Enterprise Analytics

This course introduces the student to advanced business analytics. The course covers how to manage business analytics studies, exploratory data analysis, diverse modelling algorithms, and forward-looking reporting techniques. It is assumed that the student is comfortable with programming, and can learn and use new programming languages.

*3 semester credits*

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## Management

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MANAGEMENT 400

### Leadership and Management

The purpose of this course is to introduce students to the primary tenets of leadership and management. Successful organizations foster both innovation and efficiency. Students will evaluate the different dynamics related to realizing organizational progress through the effective and efficient use of talent, structure, culture, methods, and technology. In addition to the required textbooks, students will be required to research industry journals as a way to evaluate the application of leadership and management techniques in real settings across various industries. Prerequisites: Admission to graduate study.

*3 semester credits*

MANAGEMENT 500

### Management & Marketing

This course serves as a graduate introduction to the theory and practice of both management and marketing, two separate, yet related, fields of business study. The management portion of the course will address the four key tenets

# Management

of management: planning, organizing, leading and controlling. The marketing portion of the course will address creating, delivering, and communicating value by building customer relationships via the marketing mix: product, price, place (distribution), and promotion. Both parts of the course will examine the effects of globalization, technology, and social responsibility. In addition to textbooks and other readings, the course will use individual and group projects to develop real-world solutions to challenges posed in these two disciplines.

*3 semester credits*

## MANAGEMENT 505

### **Organizational Behavior**

This course enables students to explore individual and group behavior in organizations and the contextual factors that impact workforce performance and organizational effectiveness. An understanding of topics including organizational culture and structure, ethics and corporate social responsibility, team dynamics, leadership, decision making, and motivation is emphasized. Students gain insight from the perspective of both theory-oriented research and practice-oriented professional communities through the discussion of concepts and organizational practices and the analysis of research findings and trends.

*3 semester credits*

## MANAGEMENT 511

### **Human Resources Management**

This course enables students to examine the current research findings, trends, and best practices of human resource management, as well as the strategies and tactics necessary to sustain an effective and proactive human resources function in an organization. An understanding of topics including recruitment and selection, employment law, performance management, training and development, compensation and benefits, and employee engagement is emphasized, in both domestic and global contexts. Students will gain insight into effectively leveraging findings from relevant research studies to address current and projected human resource management challenges and needs.

*3 semester credits*

## MANAGEMENT 512

### **Organizational Development**

The course is a hands-on course that provides the concepts and practical tools needed to start a small business. The course offers instruction in accounting concepts specific to small busi-

nesses experience with accounting software. Understanding of financing opportunities including bank loans and venture capital will enable the student to obtain financing for a small business. Students will also study basic financial management principles relevant to small business. The course also focuses on setting up the legal structure for the business by enabling the student to choose the appropriate organizational form and to study the regulatory and employment laws specific to small businesses. Prerequisites: MGMT 505 and completion of all required Management Major courses or concurrent registration in final required major courses.

*3 semester credits*

## MANAGEMENT 515

### **Assessment**

This course focuses on workplace assessment related to recruitment, placement, and workplace training. Performance appraisal is emphasized including employee development, development of objectives and process, monitoring, retention and separation. The understanding of selection and assessment instruments and methodology are studied as well as the statistical analysis required for psychometric assessment. Prerequisites: MGMT 400, MGMT 505 and completion of all core courses or concurrent registration in final core courses. Normally students take MGMT 511 before MGMT 512.

*3 semester credits*

## MANAGEMENT 520

### **Fundamentals of Entrepreneurship**

This course will begin by addressing the concept of development of a new venture. The course will then address the fundamentals such as the financing important to the new venture and its creator, competitive positioning, branding and imaging, stationery, marketing, protecting intellectual property, the legal entity structure, the website development components and cost. The class will teach how to source capital and then further how to pitch to capital providers. Each student will develop a minimum viable product by producing a business model canvas.

*3 semester credits*

## MANAGEMENT 522

### **Conflict & Negotiation**

The development of conflict-management and negotiating skills are taught in this course with particular emphasis on achieving effective and efficient outcomes within a global and multicultural context. Experiential exercises, readings and discussions will demonstrate various

strategies for a broad range of negotiating scenarios, e.g., buyer-seller, management-labor, personal salary increase, etc. Prerequisites for Management Major or Human Resources Management Major: MGMT 400 and MKTG 400 and completion of all required major courses or concurrent registration in final required Major courses.

*Course is cross-listed with MKTG 522.*

*3 semester credits*

## MANAGEMENT 523

### **Leadership, Teams and Managing Change**

This course focuses on the development of leadership skills important in the effective management of change. Through role-playing exercises, videotapes, diagnostic tools, seminar discussion, selected readings, and a group project, students will learn theory and build interpersonal skills necessary for providing leadership in diverse multicultural groups and organizations. The course will address the managerial issues present in organizations undergoing accelerating change and adopting a culture of creativity. Creating and sustaining high performance multi-cultural and interdisciplinary traditional and virtual teams is covered. Prerequisite: Admission to graduate studies.

*3 semester credits*

## MANAGEMENT 525

### **Counseling**

The course surveys counseling theory, counseling strategies, and appraisal procedures. The purpose is to enable the human resources manager to identify potential employee problems such as addiction, mid-life issues, and psychological disorders. This training will facilitate the ability of the manager to refer employees for professional counseling and intervention. There will also be emphasis on resolving workplace interpersonal conflicts. Prerequisite: MGMT 505 and completion of all required Human Resources Management Major courses or concurrent registration in final required major courses.

*3 semester credits*

## MANAGEMENT 534

### **Strategic Sourcing and Vendor Management**

This course covers the rewards and risks of outsourcing and vendor management and identifies where outsourcing should be used and not used. The objectives of the course are to help students understand how to plan, direct, manage and more effectively participate in outsourcing initiatives in terms of the feasibility of outsourcing (off-shore, near-shore, rural-shore, best shore), vendor selection,

## Management • Marketing

contract negotiation, vendor management and evaluation, risk assessment and terminating outsourcing deals. 3 semester credits

MANAGEMENT 535

### **Fin&Acct Non-Fin Mgrs**

3 semester credits

MANAGEMENT 539

### **International Issues**

This course focuses on current international issues that affect business operations at home and abroad. Changing business environments are discussed and analyzed. Students are required to formulate new global business strategies in light of emerging international trends and events. In some cases, students may supplement their study by field trips and on-site analysis. Prerequisites: MGMT-400, ACCT-400, FIN-400, ECON-400.

3 semester hours

MANAGEMENT 545

### **Labor & Employment Law**

Students study the current employment and labor law in the U.S. and the historical development of these laws from common law to existing law. The course covers a wide range of legal and regulatory topics needed for human resources management including workplace safety, family leave, equal employment and pay, wrongful discharge, privacy, harassment, and illegal workers. In addition, development of global laws and laws related to employment and labor in other countries are reviewed. Prerequisites: MGMT 400, BLAW 400 and completion of all core courses or concurrent registration in final core courses. Normally students take MGMT 511 before or concurrent with BLAW 545.

3 semester credits

MANAGEMENT 548

### **Business Intelligence & Decision Support Systems**

3 semester credits

MANAGEMENT 555

### **Global Program and Project Management**

This course focuses on the managerial aspects of how to effectively manage, plan and execute programs/projects with a focus on high quality deliverables arriving on time, within budget, within scope and to the customer's satisfaction. Areas covered will include program and project management life cycle phases, executive sponsorship, portfolio investment management selection and prioritization, requirements, scope and project charters, planning, development, estimating, staffing, leadership, scheduling, risk management, change man-

agement, project metrics, vendor integration and management and other related topics. This course is based on current and emerging best practices and principles. Project Management certification requirements and real world case studies are discussed.

3 semester credits

MANAGEMENT 560

### **Foundations of Business Process and Operations Management**

The student is introduced to process management methods which are fundamental to delivery of products and services. Topics covered include capacity analysis and planning, inventory management, design of jobs for quality and cost effectiveness, demand forecasting, work flow management, queuing theory, project management and total quality management.

3 semester credits

MANAGEMENT 565

### **Foundations of Product Management**

This course covers new product development, innovation and commercialization, as well as the product management life cycle. Topics covered include the feasibility and investment prioritization of new product or product enhancements, raising capital for new product development, market and customer needs analysis, make versus buy alternatives and product launch and commercialization issues and considerations, including promotion, pricing, distribution, competition, pre and post sales support, systems and infrastructure support, customer service and related areas. Students will work on individual and team projects that will include the development of a new product market/ business plan.

3 semester credits

MANAGEMENT 568

### **Technical Concepts for Analytics**

3 semester credits

MANAGEMENT 582

### **Business Planning**

This course focuses on the development of the entrepreneurial spirit and develops specific skills to fulfill plans that develop from that creative and persevering spirit. Many different aspects of entrepreneurial ability will be emphasized including a strong work ethic, leadership, team building and the development of business relationships. The course also covers the growth of an existing business through entrepreneurship. Students will conceive, develop and present a comprehensive business plan intended to obtain external financial support or internal organizational support. This

course includes a comprehensive review of the marketing, operational, financial, product, service and business strategy and plans that must be mastered and developed as foundation for start-up of a small business or entrepreneurial enterprise.

3 semester credits

MANAGEMENT 585

### **New Product Commercialization**

The objectives of the course are to understand and apply concepts and techniques of product Commercialization. The course focuses on taking student created product concepts and having student teams drive the concepts to become actual products. Product design, prototype creation, market analysis, and financial analysis all come together within the student team to create a viable product. If ideas are worthy, teams may work with the University's CTech IncUBator to actually commercialize their products. Students are strongly encouraged to find a sponsor to actually commercialize their product ideas. Prerequisite: MBA students must have completed all foundation level courses and have advisor approval.

3 semester credits

MANAGEMENT 590

### **Intellectual Property Management**

3 semester credits

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## Marketing

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MARKETING 400

### **Marketing**

The course will explore the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods and services, to create exchanges that satisfy individual, organizational, and societal objectives. The underpinnings of the marketing discipline will be taught through text, case, articles and class discussion. Mastery of these principles will come through a variety of individual and group assignments to create marketing solutions for real-world products. Prerequisite: Admission to graduate study.

3 semester credits

MARKETING 515

### **Customer Analysis**

This course will take up special topics in customer behavior utilizing knowledge not only from research on consumer behavior but from a variety of disciplines including psychology, sociology and anthropology. The leading models of customer behavior in both industrial and consumer settings will be analyzed. The qualitative and quantitative marketing research

## Marketing • Mathematics • Mechanical Engineering

tools necessary to understand buyer behavior dynamics in any market will be stressed. Prerequisite: MKTG 400 and completion of all core courses or concurrent registration in final core courses.

*3 semester credits*

MARKETING 560

### **Global Market Management**

This course analyzes strategy, planning, implementation and control for market entry and development. Topics include social, political and economic changes affecting marketing opportunity; focused versus dispersed marketing efforts; marketing in developed and undeveloped countries; and marketing systems required for the various strategic alternatives. The focus will be on creating competitive advantage in the global marketing environment. Prerequisite for Marketing Major: MKTG 400, MKTG 515 and completion of all required Marketing Major courses or concurrent registration in final required Major courses. Prerequisite for International Business Major: MKTG 400 and completion of all core courses or concurrent registration in final core courses.

*3 semester credits*

MARKETING 505

### **Marketing Research**

This course introduces students to the essentials of marketing and brand management at the graduate level. Students will learn concepts and frameworks from the marketing and branding literatures, such as the definition of marketing and the concept of Customer-Based Brand Equity (CBBE).

*3 semester credits*

MARKETING 535

### **Electronic and Mobile Business**

The goal of this course is to prepare current and future executives, managers, and strategists to be leaders and create value in the New Economy – to gain understanding and insight on how the functions of management and marketing in the New Economy have changed as well as how new technology and media forms have created a radically different business environment. The course examines the impact of the evolving virtual worlds of Internet and mobile commerce on the strategy of traditional “brick-and-mortar” companies. Up-to-date information will be utilized from current publications to provide the student with the ability to work in the new wireless world. This new business frontier requires most firms to significantly change their business strategy and presents unprecedented new

opportunities for fast acting entrepreneurs. Prerequisites for Information Technology and Knowledge Management: MKTG 400, ITKM 400, and completion of all required Information Technology and Knowledge Management Major courses or concurrent registration in final required Major courses. Prerequisites for Marketing: MKTG 400, ITKM 400, and completion of all required Marketing Major courses or concurrent registration in final required Major courses. Course is cross-listed with ITKM 535.

*3 semester credits*

MARKETING 520

### **Customer Relationship Management**

This course emphasizes the long term organizational value of developing relationships with customers. The first focus is on the use of data to provide increased value for the firm. Students will understand how to create value for the customer with a systematic analysis of customer needs. The second focus is on the nature of interpersonal relationships in a business setting that develops long lasting business relationships. Prerequisite: MKTG 515 and completion of all required Marketing Major courses or concurrent registration in final required Major courses.

*3 semester credits*

MARKETING 540

### **Personal Sales and Sales Management**

The purpose of this course is to develop the student's ability to engage in real world professional sales and sales management. The foundation of personal sales is to be able to communicate effectively in both one-on-one sales situations and in group presentation situations. Psychological theory related to persuasion and interpersonal relationships will be used to provide the foundation for specific sales techniques. Practical experience in persuading, prospecting, negotiating, referrals, closing the transaction, and responding to buyer concerns will be utilized. The course will also focus on the management of a sales force including methods of compensation, motivation, hiring and retaining sales people, and the legal and ethical aspects of selling. Prerequisite: MKTG 515 and completion of all required Marketing Major courses or concurrent registration in final required Major courses.

*3 semester credits*

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## **Mathematics**

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MATHEMATICS 401

### **Advanced Analysis for Scientists and Engineers I**

Vector spaces and the eigenvalue problem. Partial differential equations and orthogonal functions. Fourier series and integrals, boundary and initial value problems, topics in vector and tensor analysis. Prerequisites: Math 214, Math 215, and Math 301.

*3 semester hours*

MATHEMATICS 402

### **Advanced Analysis for Scientists and Engineers II**

Functions of a complex variable, conformal mapping, Laurent Series, residues and contour integration. Prerequisites: Math 214, Math 215, and Math 301.

*3 semester hours*

MATHEMATICS 403

### **Functions of a Complex Variable I**

The general theory of functions of a complex variable. Complex algebra, analytic functions and their mappings, complex integration, infinite series, Taylor and Laurent expansion, isolated singularities, residue theory. Prerequisite: Math 215 (Calculus and Analytic Geometry III) or equivalent.

*3 semester hours*

MATHEMATICS 404

### **Functions of a Complex Variable II**

Continuation of Mathematics 403. Additional topics include insofar as time permits, harmonic functions, conformal mapping and applications, normal families. Riemann mapping theorem, analytic continuation, Riemann surfaces, infinite products, entire functions. Prerequisite: Math 403.

*3 semester hours*

MATHEMATICS 407

### **Introduction to Modern Analysis**

Metric Spaces, sequences and series, continuity differentiation, Riemann-Stieltjes integral, functions of several variables.

*3 semester hours*

MATHEMATICS 411 & 412

### **Introduction to Applied Mathematics 1 & 2**

Introduction to Hilbert Space, Fourier Series, calculus of variations, boundary value problems, Green's functions and integral equations.

*3 semester hours*

MATHEMATICS 414

### **Numerical Analysis**

Interpolation, numerical differentiation and integration, numerical solution of differential equations, least squares, error analysis. Prerequisite: Math 215 (Calculus and Analytic Geometry III) or equivalent. Math 301 (Differential

## Mathematics • Mechanical Engineering

Equations) strongly recommended.

*3 semester hours*

MATHEMATICS 415

### Advanced Numerical Analysis

Convergence, numerical stability, round off error, truncation error arising from the approximation of differential and integral equations.

*3 semester hours*

MATHEMATICS 423

### Mathematical Statistics I

Probability theory, discrete and continuous distributions, transformations, moment generating functions, characteristic functions, central limit theorem, sampling distributions. Prerequisite: Math 215 (Calculus and Analytic Geometry III) or equivalent.

*3 semester hours*

MATHEMATICS 424

### Mathematical Statistics II

Continuation of Mathematics 423. Additional topics include estimation, testing of hypothesis, confidence intervals, regression, and analysis of variance. Prerequisite: Math 423 or Math 323.

*3 semester hours*

MATHEMATICS 431

### Introduction to Topology and its Application

Elements of point set theory; introduction to topological spaces including metric spaces; separation and countability axioms; connectedness; compactness; completeness. Prerequisite: One year of advanced calculus.

*3 semester hours; offered as needed*

MATHEMATICS 451

### Linear Algebra and Matrix Theory I

Linear vector spaces, bases, dimension, inner product, norm, orthogonality. Linear transformations, matrices, matrix algebra, Hamilton-Cayley Theorem, eigenvalues and eigenvectors, rank. Prerequisite: Math 391 (Modern Algebra) or equivalent.

*3 semester hours*

MATHEMATICS 453

### Modern Algebra I

Groups, rings, fields, ideals, polynomials. Prerequisite: Math 391 (Modern Algebra) or equivalent.

*3 semester hours*

MATHEMATICS 454

### Modern Algebra II

Continuation of Math 453. Modules, field extensions, Galois theory, real fields, special topics. Prerequisite: Math 453.

*3 semester hours*

MATHEMATICS 480

### Selected Topics in Mathematics

Topics of mathematics not covered in other courses. The course may be repeated as long as topical focus changes. Prerequisite: Completion of at least 24 credits in mathematics or permission of instructor.

*3 semester hours*

## Mechanical Engineering

MECHANICAL ENGINEERING 407

### Modern Materials and Advanced Manufacturing Technologies

This course focuses on the study of modern industrial materials and the process of developing creative solutions through conceptual analysis and synthesis on different advanced and automated manufacturing processes. The course will help students to learn the emerging topics in the material and manufacturing industries. The topics cover the study on today's popular industrial materials, material selections and industrial applications, and their related manufacturing techniques in US industry. Topics also include the introduction of quality control (QC) process that is important to the production with the high quality. The course has two class projects which will guide and help students to learn the ways of preparing for professional research and keep track of the latest technologies in modern materials, advanced and automated manufacturing processes.

*3 semester hours*

MECHANICAL ENGINEERING 410

### Advanced Fluid Dynamics

Advanced topics in applied fluid mechanics. Review of continuity, momentum, and energy equations for viscous, incompressible fluid; vorticity and circulation concepts and theorems. Selected topics from the following areas: Complex potential, conformal mapping and applications. Airfoil and wing theory. Boundary layer theory; similarity solutions for laminar flows, integral techniques for turbulent flows. Compression and expansion waves in compressible flows; oblique shock waves, Prandtl-Meyer flow. Propagating waves and applications; shock tube, transients in duct systems.

*3 semester hours*

MECHANICAL ENGINEERING 415

### Propulsion

The course instructs the student in aerospace propulsion systems including both air breathing and non-air breathing devices. The course reviews the basic physics, chemistry, thermo-

dynamics and gas laws applicable to propulsion devices. Details of individual engine components such as diffusers, compressors, turbines, propellers, nozzles, and afterburners as well as all major engine types (turbofans, turboprops, turbojets, ramjet) are studied. Course projects include utilization of engine propulsion software and sizing an engine for an aircraft. Prerequisite: Mechanical Engineering 203, Mechanical Engineering 307.

*3 semester hours*

MECHANICAL ENGINEERING 421

### Computer Aided Engineering Design

This course applies 3-D CAD system e.g., Pro E to industrial product and system design. These CAD systems are very practical and powerful 3-D CAD tools and they have been widely used in the industry. The first half of the class focuses on learning fundamentals of the 3-D system, its popular applications and its related techniques. The special topics of design concept are also included. The second half covers several practical projects. Students will combine the design techniques with the real project and use 3-D tools to design the product or part of industrial system. All projects will be presented by students in class.

*3 semester hours*

MECHANICAL ENGINEERING 422

### Advanced Computer Aided Project Design

This advanced course focuses on some hot and very practical topics in today's industrial design applications. Also, some useful knowledge, such as PLC (Program Logic Control), calculation and selection of industrial motors, fundamentals of automation, sensor technology, and selection of material on different industrial applications are included. Several more complicated projects in this class will help students learn how to manage the different engineering projects and understand all related design issues which will improve the future production and manufacturing process. Pro-E will be used as a 3-D CAD tool to design these advanced engineering projects. All projects should be presented by students in the class.

*3 semester hours*

MECHANICAL ENGINEERING 423

### Computer Aided Manufacturing (CAM) and NC Machining

This course applies manufacturing and various numerical controlled software for designing computer-aided manufacturing and NC machining systems, processes and algorithms. This course is heavy in implementation of vari-

# Mechanical Engineering

ous manufacturing technologies and programming of NC machines.

*3 semester hours*

MECHANICAL ENGINEERING 424

## **Advanced CAM & Automation.**

This course teaches students to simulate advanced manufacturing processes by learning high level functions in Pro-Engineer/Pro-Manufacturing software package. This course will cover the topics of some advanced and special manufacturing technologies, including laser cutting & welding, water jet cutting & cleaning, and plasma cutting & welding. Automation related topics will also be introduced, including the analysis and application of PLC control systems in manufacturing facilities and modern production systems. Several advanced and real projects will help students to be proficient in using this CAD/CAM package and learn more of US industrial & engineering knowledge through the instructor's lectures & guidance and also the students' self-motivated work.

*3 semester hours*

MECHANICAL ENGINEERING 425

## **Machinery and Mechanical System Design**

This course focuses on the process of developing creative solutions through conceptual analysis and synthesis on machinery and biomedical instrument design and development processes. The topics cover the concepts of automated and high speed machinery design, basic biomedical instrument design, FDA regulation in biomedical instrument design, basic instrument mechanism design in assisting manufacturing processes, and other biomedical design techniques in today's US biomedical industries. Pro/Engineer will be used as the computer-aided design CAD tool to design the high function machinery and biomedical instrument in this class.

*3 semester hours*

MECHANICAL ENGINEERING 426

## **Material Selection for Mechanical Engineers**

This course provides students a systematic approach to the selection of materials and processes at various design stages for mechanical engineering applications. The concept of materials performance indices and materials selection charts are introduced with the detailed background of material properties, processing, and mechanics. Structured case studies are shown to use this methodology to select materials for numerous mechanical designs. CES Edu Pack will be introduced as a materials and processes database and a tool for students to compare, analyze and select materials and processes.

*3 semester hours*

MECHANICAL ENGINEERING 429 (MEEG 429/ELEG 429)

## **Electronics Cooling**

Thermal management is an important aspect in the design and manufacturing of electronics devices and systems. Power dissipation levels have grown continually every year due to increased functionality and integration in the electronics devices and systems. Appropriate thermal design is imperative in order to prevent high temperature failures, increase the life expectancy of a system, reduce emitted acoustic noise and energy consumption, and meet stringent requirements for reliability. This course teaches students the fundamentals of heat transfer in electronics devices and systems and conduct effective thermal analyses using commercial CFD packages. The course is structured as a combinations of lectures, case studies, and tutorials. Heat transfer theory and discussions of engineering practices will be applied to the thermal design and analysis of electronic systems. Numerical simulation and commercial CFD package will be introduced for thermal fluid analysis and design of electronics systems and "real world" case studies will be used for class discussions and student presentations. The topics including thermal management at the component, board, and system levels, heat sink design, heat pipes, phase-change cooling, and data center cooling.

*3 semester hours*

MECHANICAL ENGINEERING 430

## **Design & Innovation**

The objective of this course is to convey a sense of Design and Innovation in the development of products. To accomplish this the class shall review a number of case studies and participate in the design of a project. In addition to the semester project we shall discuss a number of topics of concern to Design and Engineering through illustrated talks (slides/tapes) and when available with guest designers and engineers.

*3 semester hours*

MECHANICAL ENGINEERING 440

## **Ergonomic Factors in Design**

This course introduces the student to the concepts of ergonomics. Ergonomics is the study of fitting the workplace and devises to the capabilities of the human worker. Students will have an understanding of the beginnings and evolution of the field of ergonomics. They will learn to recognize risk factors associated with repetitive stress disorders (e.g., carpal

tunnel syndrome) and potential sprain/strain injuries as well as be familiar with the body areas affected. This course covers principles of physiology and biomechanics and how they apply to workstation and tool design.

*3 semester hours*

MECHANICAL ENGINEERING 441

## **Heating, Ventilating and Air-Conditioning System Design I**

This course focuses on the principles of Heating Ventilating and Air Conditioning with understanding of: thermodynamics and psychrometrics; basic HVAC system calculations; design conditions, environmental indices, and control of indoor air quality; heat transmission and solar radiation, including heat transfer coefficients; load estimating fundamentals; cooling and heating load calculations; common basic elements of HVAC systems and types.

*3 semester hours*

MECHANICAL ENGINEERING 442

## **Heating, Ventilating and Air-Conditioning System Design II**

Complete heat loss and heat gain calculations for commercial and industrial buildings will be performed in laboratory through Trane Engineering program software. Students will learn how to layout and design systems per given building architectural plans, using appropriate software, codes, standards, and owner's requirements. Students will select appropriate HVAC equipment, size duct and piping systems; and conduct economic analysis. Energy estimating methods will be studied and an analysis of an actual building conducted. Current federal, state and local codes and standards (ASHRAE) will be examined as they apply to HVAC systems.

*3 semester hours*

MECHANICAL ENGINEERING 451

## **Advanced Strength Analysis**

This course is designed to give students an advanced understanding of mechanics of materials and their usage in design of mechanical structures and systems. Two-dimensional and three dimensional stress and strain, stress and strain relations, principal stresses; failure theories, factors of safety, stress concentration; beam theory, plate theory, column theory, thin-walled pressure vessels; energy methods, contact stresses, thermal strains, impact effects, fatigue and fracture, elastic stability. This course includes a design project.

*3 semester hours*

MECHANICAL ENGINEERING 452

## **Advanced Vibrations**

Brief review of systems with one and two

# Mechanical Engineering

degrees of freedom. Rayleigh's method. Application of Lagrangian and matrix methods to discrete systems with many degrees of freedom; normal mode theory; vibrations of finite continua; solution methods and mathematical properties. Numerical and computer methods. Sensitivity analysis. Applications to machines and structures.

*3 semester hours*

MECHANICAL ENGINEERING 453

## **Finite Element Methods in Mechanical Engineering**

Formulation of finite element characteristics using energy methods. Convergence criteria. Consistent load and mass matrices. In-plane and axisymmetric analysis using simple and higher-order triangular and quadrilateral elements. Finite element analysis of plate-bending problems. Isoparametric concepts and formulation; applications to two- and three-dimensional stress analysis. Topics from the following areas will be chosen as time allows: buckling and vibration studies using discrete element techniques; finite element applications in fluid flow and heat transfer.

*3 semester hours*

MECHANICAL ENGINEERING 454

## **Advanced Dynamics**

Orthogonal coordinate systems and their transformations. Particle kinematics in inertial and noninertial rotating coordinate systems. Dynamics of systems of particles and rigid bodies. Virtual work and generalized coordinates. Lagrange's equations and Hamilton's principle for holonomic and non-holonomic systems with applications. Lagrange multipliers.

*3 semester hours*

MECHANICAL ENGINEERING 456

## **Mechanics of Composite Materials**

Introduction to the mechanics of laminated filamentary composites. Prediction of stiffness and strength of laminated plates. Applications.

*3 semester hours*

MECHANICAL ENGINEERING 458

## **Fatigue and Fracture Mechanics**

Brittle fracture of structures, elastic stress analysis of cracked components, static and dynamic failures, plane stress and plane strain, elastic-plastic fracture mechanics, fatigue crack growth and life prediction under constant and variable amplitude loading, environmental effects. Term work is mainly design problems and is computer oriented.

*3 semester hours*

MECHANICAL ENGINEERING 460

## **Introduction to Robotics**

Basic robotics including: position and velocity sensing, actuations, control theory, robot coordinate systems, robot kinematics, differential motions, path control, dynamics, and force control. Robot sensing, simulation of manipulators, automation, and robot programming languages are also investigated.

*3 semester hours*

MECHANICAL ENGINEERING 462

## **Applied Thermodynamics**

This course is designed to review the fundamentals of classical thermodynamics and apply them to the analysis and design optimization of power and refrigeration energy systems incorporating heat exchangers and combustion processes. The topics include: principles of thermal energy conversion; properties of pure substances and mixtures; first and second laws of thermodynamics; entropy; exergy; closed and open systems of various types; applications of the principles of thermodynamics to components and systems, including pumps, compressors, engines, turbines, power plants, renewable energy systems; power and refrigeration cycles.

*3 semester hours*

MECHANICAL ENGINEERING 463

## **Advanced Heat Transfer**

Topics in conduction, convection and radiation heat transfer. Numerical methods, phase change, boundary layer principles, gas and solar radiation, combined heat and mass transfer.

*3 semester hours*

MECHANICAL ENGINEERING 464

## **Thermal Renewable Energy System**

This course provides the examination of using renewable energy resources within thermal fluid systems. This class will explore principles and technical details of various thermal renewable energy technologies, such as solar heating & cooling, solar power plant, thermal energy storage, wind energy, geothermal. This course also will dedicate upon the environmental consequences of energy conversion through the US standards and codes.

*3 semester hours*

MECHANICAL ENGINEERING 467

## **Introduction to Mechatronics**

This course covers development of Mechatronics theory and application to intelligent systems dependent upon the integrated disciplines of mechanical, electronic, computer and software engineering. The course examines the following: mechatronics system design, sensors and transducers, actuating devices, signals systems and controls, real-time interfacing, hardware

components and software with applications in mechatronics.

*3 semester hours*

MECHANICAL ENGINEERING 470

## **Satellite Design and Technology**

This course teaches the entire process of small satellite design, fabrication, integration and testing. The course covers the following topics: history of satellite design, satellite mission design; environment and hazards of space flight; orbits and astrodynamics (including spacecraft orbital elements and satellite tracking software); thermal control, materials and structures, power (including solar panels), propulsion, overview of payloads (communications and observation) data acquisition systems; ground station operation; NASA small satellite testing specifications and thermal, vacuum and vibration testing.

*3 semester hours*

MECHANICAL ENGINEERING 477

## **Additive Manufacturing**

Additive manufacturing (AM) or 3D printing is a process of joining materials to make objects from 3D computer aided design (CAD) data. This course is designed to introduce students to the various AM processes, their theory and industrial practices, the latest developments and critical challenges in developing novel AM processes and applications. The expected outcome of this course is to train future engineers to innovate AM processes, select appropriate AM process for specific design-manufacturing applications. It includes a design project with 3D printing practices.

*3 semester hours*

MECHANICAL ENGINEERING 479

## **CNC Machine Control and Milling**

This course introduces the CNC milling machine to students. Included are machine and shop safety, CNC coding, material selection, machine maintenance, proper use of the coolant systems and tools. Routine machine procedures and implementation are covered in preparation for several machine operations to develop student skills.

*3 semester hours*

MECHANICAL ENGINEERING 490

## **Intellectual Property and Technology**

This course is designed for graduate students who have an undergraduate degree in Engineering. Computer Science, Mathematics, Physics, Biology, Industrial Design, etc. Students need not have any familiarity with United States law but they must be prepared to read extensively under the instructor's

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guidance, statutes and cases decided by the Federal and State courts.

*3 semester hours*

MECHANICAL ENGINEERING 500

## Graduate Co-op/Internship in Mechanical Engineering

By arrangement.

*1-3 semester hours*

MECHANICAL ENGINEERING 505

## Welding Engineering

Welding is the most common method of joining similar as well as dissimilar materials. It has been used in almost all manufactured products in various sections of industries, such as pipelines, pressure vessels, aircraft, automobiles, microelectronic devices, medical devices, etc. Welding is a complex engineering discipline that involves processes, material science, design, inspection and quality assurance. This course is intended to provide knowledge of welding engineering and its application in developing and designing safe and durable welded structures. Major welding processes and their technical background will be introduced. This course also addresses design fundamentals applicable to welded structures and modeling and simulation of welding processes.

*3 semester hours*

MECHANICAL ENGINEERING 507

## Management of Engineering Projects

The course focuses on the methods used to transform an engineering idea into practice. The course follows taking engineering design through the stages of systems engineering and new product development. Topics include project initiation, cost estimating and budgets, proposal writing, scheduling and planning, project tracking, construction, and startup.

*3 semester hours*

MECHANICAL ENGINEERING 508(MEEG 508/BMEG 508)

## Biomechanics

Biomechanics is the application of mechanical principles to living organisms that included bioengineering, research and analysis of mechanism in living organisms, and application of engineering principles to and from biological systems. This course can be carried forth on from the molecular level including collagen and elastin, all the way up to the tissue and organ level. Some simple applications of Newtonian mechanics can supply approximations on each level, but precise details demand the use of continuum mechanics.

*3 semester hours*

MECHANICAL ENGINEERING 510

## Air and Space Vehicle Design

This course teaches the entire process of air flight vehicle and spacecraft conceptual design - from requirements definition to initial sizing, configuration layout, analysis, sizing, as well as the aeronautics and astronautics and environmental differences in which these vehicles travel. Conceptual similarities and differences between the two classes of vehicles are emphasized. The term project develops a prototype model vehicle implementation. Prerequisite: Mechanical Engineering 307

*3 semester hours*

MECHANICAL ENGINEERING 512

## Computational Fluid Dynamics (CFD)

Computational fluid dynamics (CFD) is employed in a wide range of industries and disciplines, such as aerospace engineering, automotive engineering, biomedical science and engineering, chemical engineering, civil engineering, power engineering and sports engineering. Practicing engineers are constantly facing extreme challenges to solve complex fluid flow and heat transfer problems using commercial CFD software. To avoid flawed CFD simulation and results interpretation using commercial CFD packages by users with inadequate training, understanding the fundamental principles that underlie commercial CFD solvers can help the users to effectively harness the power of modern CFD for their research or design. This course is intended as an introduction to the scientific principles and practical engineering applications of CFD. It combines lectures on the CFD principles with projects of research or industrial applications. The emphasis of this course is not to teach the theory behind the CFD techniques, but to help the students apply the knowledge gained into practical use of commercial CFD software (COMSOL, ANSYS and/or STAR-CCM+). Students will apply these skills to relevant engineering applications and gain an appreciation of the limitations and advantages of CFD modeling.

*3 semester hours*

MECHANICAL ENGINEERING 523

## Advanced Composite Materials

Composite materials are ideal for structural applications where high strength-to-weight and stiffness-to-weight ratios are required. Aircraft and spacecraft are typical weight sensitive structures in which composite materials cost-effective. Usually, composite materials consist of two separate components, the matrix and the filler. The matrix is the component that holds the filler together and the filler makes the material strong. Most aerospace-applica-

tion composites have strong, stiff long fibers as the fillers. The fiber makes the material behaves differently in different directions. This anisotropic behavior introduces complication in the analysis of the composite material. The course introduces the student to the basic concepts of the mechanical behavior of composite materials. Specific topics include the stress-strain relation for a lamina, micromechanics of composite materials, bending, buckling, and vibration of composite plates with various laminations, fatigue, fracture mechanics, and joints of composite structures.

*3 semester hours*

MECHANICAL ENGINEERING 530 (MEEG 530/TCMG 530)

## Foundations of Manufacturing Management

The objectives of the course are to understand and apply concepts and techniques in manufacturing management. The course includes the management of people (both traditional and high performance systems and teams), lean manufacturing techniques as used on the factory floor, and recent concepts such as Factory Physics. The course focuses on those issues that are important in supervising and managing a modern manufacturing operation.

*3 semester hours*

MECHANICAL ENGINEERING 538

## Manufacturing and Service Engineering

The course covers service industry principles, manufacturing systems, facility layout, Factory Physics, Theory of Constraints, aspects of lean manufacturing, manufacturing for sustainability, and manufacturing safety as well as the management of people in service and manufacturing environments.

*3 semester hours*

MECHANICAL ENGINEERING 540

## Simulation and Modeling Techniques

The purpose of this course is to provide an in depth coverage of the use of simulation and modeling as an analysis tool for the study of production and distribution processes. The course aims to develop a sense of critical thinking, learning and problem solving. Topics include: problem formulation, data collection and analysis, random variable generation, and statistical analysis of output. Utilizes a major simulation language, SIMAN.

*3 semester hours*

MECHANICAL ENGINEERING 546 (MEEG 546/TCMG 546)

## Engineering Economics and Management

The course covers the concepts and methods that will assist engineering and technology managers and professionals to make alterna-

## Mechanical Engineering

tive investment and funding decisions regarding projects, programs, products, business expansion and other alternatives using the financial calculations involving time value of money (IRR, ROI, NPV), uncertainty and risk. Topics include engineering and related financial evaluation techniques and formulas, choosing among alternatives, sensitivity analysis, economic analysis, opportunity costs, depreciation, amortization, probability, cost estimating and systems and others.

*3 semester hours*

MECHANICAL ENGINEERING 550

### **Aerodynamics and Hydrodynamics in Sports**

The course is intended to instruct the student in general topics in sports aerodynamics and hydrodynamics and sport specific advanced topics, develop the methods and means of formulating the mathematical models of physical systems, develop problem-solving skills, develop knowledge and skill in experimental and numerical methods in areas of aerodynamics and hydrodynamics-related mechanical engineering. Prerequisite Mechanical Engineering 307.

*3 semester hours*

MECHANICAL ENGINEERING 560 (BMEG 560/MEEG 560)

### **Advanced Tissue Engineering**

This course deals with specific elements of tissue engineering design and analysis. Approaches to the regeneration of three tissue systems will be analyzed utilizing engineering design. Concepts ranging from tissue development and dynamic growth conditions to ultimate tissue properties will be addressed. Students will be required to acquire understanding and expertise from analysis of primary literature and will complete group presentations on directed approaches to tissue design and engineering in three tissue systems. To ensure in-depth understanding of different aspects of tissue engineering the groups will be required to focus on one or two key aspects in each mini design module.

*3 semester hours*

MECHANICAL ENGINEERING 561 (MEEG 561/BMEG 561/ELEG 561)

### **Instrumental Analysis of Nanomaterials**

The course will give an over view on several important analytical tools for nano materials characterization. Mechanical, electrical and electronic and biological property testing of the nano materials such as carbon nanotubes, metal nanoparticles, quantum dots, nanowires conformable nanoelectronics materials, polymer nanoparticles and biomedical nanomaterials will be discussed. Process and product

evaluation by physical, chemical and microscopic methods for materials in nano-regime will be highlighted. Modern materials science depends on the use of a battery of analytical methods carried normally in specialized laboratories. This course explains the fundamental principles associated with the various methods and familiarize the students with them, their range of applicability and reliability especially when materials are of nanoscopic dimension.

*3 semester credits*

MECHANICAL ENGINEERING 562 (MEEG 562/BMEG 562/ELEG 562)

### **Nanofabrication with Soft Materials**

This is an advanced level graduate course focusing on fabrication of soft materials. Nanofabrication processes and Nano system products will be discussed. Fundamentals associated with chips fabrications and linking them toward soft materials assembly will be detailed. Emerging nanotechnology based methods for soft and green electronics, mechanical parts, MEMS, PCBS will be covered. Gene chip, label free sensory assay using micro and Nano fluidics will be discussed. Transfer printing, DNA-protein interactions using the chip and several Nano-scale assemblies for soft materials fabrication will be discussed.

*3 semester credits*

MECHANICAL ENGINEERING 563

### **Polymer Nanocomposite**

*3 semester credits*

MECHANICAL ENGINEERING 565 (MEEG 565/BMEG 565)

### **Biomedical Materials and Engineering**

This course introduces the students with the progress of biomaterials used in biomedical engineering. This course discusses modern advanced level biomaterials and their engineering principles associated with their biomedical use. Hip, knee Prostheses, implants, grafts, sutures, stents, catheters materials and their application in Biomedical Engineering are covered. Designed biomaterials such as silicones, polyurethane, Teflon, hydrogels, bio nanocomposites are detailed. Modern Biology and biomedical engineering such as protein absorption, bio specific medical materials, nonfouling materials, healing and foreign body reaction, controlled release etc. are discussed. Surface-immobilized biomolecules in patterned surfaces are explained with specific examples of the use of immobilized biomolecules, immobilized cell ligands, and immobilization methods. Recent advances in biomedical engineering from the perspectives of inkjet

printing of cells and tissues for 3D medical textiles, nanofibers and films in biomedical engineering by electrostatic spinning, bio-inspired materials through layer by layer (LBL) assembly and biogels and advanced instrumentations in biomedical engineering are updated. Artificial red blood and skin substitutes, orthopedic biomaterials applications adhesives and sealants, diagnostics, biomedical sensors, extracorporeal artificial organs and ethical issues of biomedical engineering are discussed.

*3 semester hours*

MECHANICAL ENGINEERING 567 (MEEG 567/BMEG 567)

### **Physiological Fluid Mechanics**

There is a great and vital difference between the transport processes in the human body from other engineering systems. A thorough understanding of physiological fluid mechanics is essential for innovation in medical assist and monitoring devices. Emphasis in this course is placed on assist devices, flow and thermal measurements, modeling for engineering application, and understanding application to biomedical problems including assist and monitoring devices.

*3 semester hours*

MECHANICAL ENGINEERING 572

### **Production Technology and Techniques**

This course is to introduce up-to-date technology, techniques and systems of the global manufacturing industry. American manufacturing situation would be analyzed and Japanese manufacturing success is also explored. Comprehensive and readable description of manufacturing practice is researched.

*3 semester hours*

MECHANICAL ENGINEERING 573

### **Supply Chain Management**

The goal of this course is to cover not only high-level supply chain strategy and concepts, but also to give students a solid understanding of the analytical tools, to understand supply chain design, planning, and operation driven the performance of a firm. It also conveys how supply chain drivers used on a conceptual level during supply chain design and operation leading to performance improvement.

*3 semester hours*

MECHANICAL ENGINEERING 574

### **Principles of Logistics**

This course presents materials management, logistics theory and concepts in today's manufacturing and commercial environments. It integrates all of the functional areas of the business as well as incorporating logistics into corporate operation. They are examined in

## Mechanical Engineering • Music Education

light of how they interrelate with other functions for the firms.

*3 semester hours*

MECHANICAL ENGINEERING 575

### **Manufacturing Strategy**

This course provides the necessary strategic perspective for manufacturing managers' sights and sustaining manufacturing excellence in the competitive manufacturing environment. The strategic perspective of manufacturing forms that the approach places these issues within the rightful context. It emphasizes the essential requirement to link with other functions in order to determine the best strategies for the business as a whole.

*3 semester hours*

MECHANICAL ENGINEERING 577

### **Lean Manufacturing**

This course teaches the core methods and philosophy of lean manufacturing. Lean Manufacturing is historically based on the Topoto Production System used to significantly reduce the time, increase the reliability and reduce the cost, space requirements and inventory of a manufacturing environment. Each week a different aspect of the Lean Manufacturing will be taught. Each week, homework will focus on the implementation of these concepts into the term project designs.

*3 semester hours*

MECHANICAL ENGINEERING 580(TCMG/MEEG/ELEG 580, DSNMG 580, MGMT 585, IDDSN 480)

### **New Product Commercialization**

The objectives of the course are to understand and apply concepts and techniques of product commercialization. The course focuses on taking student created product concepts and having student teams drive the concepts to become actual products. Product design, prototype creation, market analysis, and financial analysis all come together within the student team to create a viable product. If ideas are worthy, teams may work with the University's CTech IncUBator to actually commercialize their products. Students are strongly encouraged to find a sponsor to actually commercialize their product ideas.

*3 semester hours*

MECHANICAL ENGINEERING 597 A

### **Master's Project**

Lecture hours and topics to be arranged with

Department Chair.

*1 credit hour*

MECHANICAL ENGINEERING 597 B

### **Master's Project**

Lecture hours and topics to be arranged with Department Chair.

*2 credit hours*

MECHANICAL ENGINEERING 597 C

### **Master's Project (completion)**

Lecture hours and topics to be arranged with Department Chair.

*1 credit hour*

MECHANICAL ENGINEERING 598

### **Thesis in Mechanical Engineering**

Lecture hours, semester hours and topics to be arranged.

*3-6 semester hours*

MECHANICAL ENGINEERING 599

### **Independent Study in Mechanical Engineering**

Independent study of advanced topics in Mechanical Engineering and submission of project report as required. Problem assignment to be arranged with and approved by the Department Chair.

*3 semester hours*

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## **Music Education**

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MUSIC EDUCATION 435

### **Designing Curriculum and Instruction in Music**

In this seminar, students will explore, and critically reflect upon, the relationships among music, philosophy, psychology, sociology, and education. Course content includes aesthetic and praxial philosophies of music and the arts (from ancient Greece to the present) as well as the psychology of music, the history and sociology of music, and influential practices and schools of thought within the profession (i. e. Dalcroze, Gordon, Kodaly, Orff). Students will explore the implications of course concepts for contemporary music education at all grade levels.

*3 semester hours*

MUSIC EDUCATION 511

### **Conducting**

Students will acquire or refine further the fundamentals of an effective conducting technique, as well as rehearsal techniques and approaches to score study. 3 semester hours.

MUSIC EDUCATION 520

### **Group Instruction in Voice**

Designed to provide the future school music

teacher with improved proficiency as a singer, an understanding of vocal development, and the ability to develop students' singing voices at all grade levels.

*3 semester hours.*

MUSIC EDUCATION 521

### **Group Instruction in Strings**

Designed to provide the future school music teacher with basic proficiency on string instruments, and the skills needed to teach string players at all grade levels.

*3 semester hours.*

MUSIC EDUCATION 523

### **Group Instruction in Woodwinds**

Designed to provide the future school music teacher with basic proficiency on woodwind instruments, and the skills needed to teach woodwind players at all grade levels.

*3 semester hours.*

MUSIC EDUCATION 525

### **Group Instruction in Brass**

Designed to provide the future school music teacher with basic proficiency on brass instruments, and the skills needed to teach brass players at all grade levels.

*3 semester hours*

MUSIC EDUCATION 526

### **Group Instruction in Percussion**

Designed to provide the future school music teacher with basic proficiency on both pitched and unpitched percussion instruments, and the skills needed to teach percussionists at all grade levels.

*3 semester hours*

MUSIC EDUCATION 531

### **Literature and Techniques for Choral Music**

A study of choral literature and rehearsal techniques appropriate for all grade levels.

*3 semester hours*

MUSIC EDUCATION 532

### **Literature and Techniques for Instrumental Music**

Study of band, orchestra, and jazz ensemble literature with emphasis on rehearsal techniques and problems related to band and orchestra organization.

*3 semester hours*

MUSIC EDUCATION 541

### **Choral Practicum**

Designed to give the music education student an opportunity to expand conducting technique, develop rehearsal techniques, and expand familiarity with standard choral literature. Opportunity will be provided to rehearse and conduct University choral ensembles.

*1 semester hour*

## Music Education • Naturopathic Medicine

MUSIC EDUCATION 542

### **Instrumental Practicum**

Designed to give the music education student an opportunity to expand conducting technique, develop rehearsal techniques, and expand familiarity with standard instrumental literature. Opportunity will be provided to rehearse and conduct University instrumental ensembles.

*1 semester hour*

MUSIC EDUCATION 543

### **Music in Elementary Schools**

Musicianship skills, musical repertoire, pedagogy, and problem-solving for teaching music in prekindergarten through grade six.

*3 semester hours*

MUSIC EDUCATION 544

### **Music in Secondary Schools**

Musicianship skills, musical repertoire, pedagogy, and problem-solving for teaching music in secondary schools.

*3 semester hours*

MUSIC EDUCATION 590

### **Resident Teaching in Music**

Candidates for Connecticut certification as music teachers (PreK-12) undertake full time resident teaching in two schools under the supervision of a cooperating teacher and a University supervisor.

*6 semester hours*

MUSIC EDUCATION 599

### **Independent Study**

Specialized advanced projects in subjects not covered by course offerings. Conferences with designated independent study advisor. Permission of program director required.

*1-3 semester hours*

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## **Naturopathic Medicine**

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### **Basic Sciences**

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BASIC SCIENCES 511

#### **Anatomy I**

This course provides an in depth study of the macroscopic human anatomy and it covers the structure of the trunk and posterior neck. Clinical aspects of the vascular and neurological relationships of these regions will be emphasized.

*4 lecture hours; 4 semester credits*

BASIC SCIENCES 511 L

#### **Anatomy I Lab**

Anatomy laboratory to apply and reinforce information acquired in lecture. Exercises include the dissection of human cadavers and the study of bones, models and interactive multimedia software.

*3 laboratory hours; 1.5 semester credits*

BASIC SCIENCES 512

#### **Histology**

This course is the study of the normal microscopic anatomy of the body and its relationship to function at the cellular, tissue, and organ level. Included is the study of the microstructure of epithelia, connective tissue, muscle, nervous system, digestive system, circulatory, reproductive systems and the endocrine system. Where indicated, there is an integration of normal histology with physiological and clinical concepts.

*2 lecture hours; 2 semester credits*

BASIC SCIENCES 513

#### **Embryology**

This course covers the developmental process of humans from conception to birth including the formation of tissues, organs and systems of the body, integrating histology and anatomy.

*1 lecture hour; 1 semester credit*

BASIC SCIENCES 514

#### **Biochemistry I**

This course introduces the student to the fundamentals of protein structure, DNA replication, gene expression, transcription, and translation.

*2 lecture hours; 2 semester credits*

BASIC SCIENCES 515

#### **Physiology I**

This course is the study of physiology at the molecular and cellular level. Included is the study of the function of all major tissues and organ systems. Clinical concepts and correlations are discussed.

*3 lecture hours; 3 semester credits*

BASIC SCIENCES 521

#### **Anatomy II**

This course is a continuation of Anatomy I and it covers the structure of the head, anterior neck and extremities. Clinical aspects of the neurological and vascular relationships of these regions will be emphasized. Prerequisites: NBS 511, NBS 511 L, NBS 512, NBS 513

*4 lecture hours; 4 semester credits*

BASIC SCIENCES 521 L

#### **Anatomy II Lab**

Anatomy laboratory to apply information acquired in lecture. Exercises include the dissection of human cadavers and the study of bones, models and interactive multimedia

software. Prerequisites: NBS 511, NBS 511 L, NBS 512, NBS 513

*3 laboratory hours; 1.5 semester credits*

BASIC SCIENCES 522

#### **Public Health I**

Introduction to basic concepts of public health and epidemiology. Exploration of historical and contemporary cases in public health that shape current understanding of population health and disease prevention. Methods of instruction include lecture, discussion, assigned reading, and group work. Laboratory portion will focus on active identification, measurement, and problem-solving of common issues in the surrounding community. Prerequisite: NPS 501

*2 lecture hours; 2 semester credits.*

BASIC SCIENCES 523

#### **Public Health II**

Exploration of themes in public health and epidemiology through the perspective of the naturopathic doctor in clinical practice. Connecting historical and contemporary problems in public health to clinical reasoning and naturopathic problem-solving. Methods of instruction include lecture, discussion, assigned reading, and group work. Laboratory portion will focus on active use of public health tools to solve problems in the surrounding community. Prerequisite: NBS 522

*2 lecture hours; 2 semester credits*

BASIC SCIENCES 524

#### **Biochemistry II**

This course is a continuation of NBS 514 Biochemistry I. Prerequisite: NBS 514, NBS 515

*2 lecture hours; 2 semester credits*

BASIC SCIENCES 525

#### **Physiology II**

This course is a study of the physiology at the organ and systems level and its interrelationships. Included is the study of the circulatory, endocrine, respiratory, renal, gastrointestinal, urogenital and nervous system. There is an integration of normal and pathological physiology and clinical concepts. Prerequisites: NBS 511, NBS 512, NBS 514, NBS 515.

*3 lecture hours; 3 semester credits*

BASIC SCIENCES 526

#### **Neuroscience**

This course covers the anatomy and physiology of the central nervous system and of the cranial nerves. The organization of cortical and subcortical motor and sensory systems including the basal ganglia, cerebellum, and the brainstem is covered as well as higher cortical

# Naturopathic Medicine

functions and parcellation of function in the cerebral cortex. Prerequisites: NBS 511, NBS 512  
*2 lecture hours; 2 semester credits*

BASIC SCIENCES 527

## Microbiology I

Comprehensive overview of structure, function, growth, and genetics of microorganisms. Methods of instruction include lecture, discussion, and assigned reading.

*1.5 lecture hours; 1.5 semester credits*

BASIC SCIENCES 528

## Microbiology II

Bacteriology, virology, and mycology with an emphasis on modes of transmission, symptoms, diagnosis, treatment, and prevention of associated diseases. Methods of instruction include lecture, discussion, and assigned reading. Prerequisite: NBS 527

*1.5 lecture hours; 1.5 semester credits*

BASIC SCIENCES 529

## Biomedical Integration Lab I

This course integrates the concepts of anatomy, physiology, biochemistry, and histology in a case-based format.

*2 laboratory hours; 1 semester credit*

BASIC SCIENCES 530

## Biomedical Integration Lab II

This course is a continuation of NBS 529 Biomedical Integration Lab I. This course integrates the concepts of anatomy, physiology, biochemistry, and histology in a case-based format. Prerequisites: NBS 511, NBS 512, NBS 514, NBS 515, NBS 529.

*2 laboratory hours; 1 semester credit*

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## Botanical Medicine

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BOTANICAL MEDICINE 511

### Botanical Pharmacy Lab

This course introduces the history, identification, plant taxonomy, and nomenclature of medicinal plants used by the Naturopathic Physician, while providing practical experience in the preparation and extraction of botanical medicines.

*1 laboratory hour; 0.5 semester credit*

BOTANICAL MEDICINE 521

### Phytopharmacognosy

This course is an overview of biochemical plant constituents, their interactions, energetics and synergy. Indications and contraindications of applications as well as drug/herb/supplement interactions are explored.

*1.5 lecture hours; 1.5 semester credits*

BOTANICAL MEDICINE 611

## Botanical Medicine I

This course comprises a detailed survey of plants and plant preparations used in naturopathic practice, integrating traditional herbal knowledge with modern pharmacological research. The botany and ethnobotany, pharmacodynamics, phytochemistry, toxicology, and therapeutics of each plant are considered. Prerequisites: NBM 511, NBM 521, NBS 524, NBS 525.

*2 lecture hours; 2 semester credits*

BOTANICAL MEDICINE 621

## Botanical Medicine II

This course is a continuation of Botanical Medicine I. Safe, effective, and appropriate prescription of plant medicines in patient care, based on both historical information and current scientific knowledge. Prerequisite: NBM 611.

*2 lecture hours; 2 semester credits*

BOTANICAL MEDICINE 711

## Botanical Medicine III

This course is a continuation of Botanical Medicine II and includes advanced topics in botanical medicine, including materia medica, clinical applications, and current research. Prerequisite: NBM 621.

*1.5 lecture hours; 1.5 semester credits*

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## Clinical Nutrition

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NUTRITION 611

### Nutrition I

This course provides the foundation for therapeutic nutrition. It explores the biochemistry of the macronutrients as well as the known vitamins and minerals in detail. Toxicities, deficiencies, therapeutic uses and appropriate doses are examined. Dietary requirements for micro and macro nutrients are covered. Prerequisites: NBS524, NBS525

*2 lecture hours; 2 semester credits*

NUTRITION 621

### Nutrition II

Nutrition II builds on the concepts learned in Nutrition I. Basic concepts of nutritional counseling, nutraceutical supplementation therapy, and therapeutic diet prescriptions are covered. Prerequisite: NNT611.

*2 lecture hours; 2 semester credits*

NUTRITION 711

### Nutrition III

This course builds on previous nutrition courses, biochemistry, and research methods to focus on how to safely and effectively use vitamins, minerals, amino acids and other nu-

trients to improve health and address disease. Drug- nutrient interactions, nutrient-nutrient interactions, and food nutrient interactions are learned, as well as, how to apply naturopathic principles to therapeutic prescription of nutrients. Prerequisites: NNT621, NCS621

*2 lecture hours; 2 semester credits*

NUTRITION 721

### Nutrition IV

This course builds on previous nutrition courses and focuses on the use of food as medicine and therapeutic diets and clinical nutrition. Students will be expected to synthesize knowledge from biochemistry and basic nutrition for application to clinical conditions and lifespan issues. This class also explores current research and trends in nutrition and socioeconomic and cultural aspects related to food and diet therapy. Prerequisite: NNT711.

*1.5 lecture hours; 1.5 semester credits*

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## Clinical Sciences

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CLINICAL SCIENCES 512

### Emergency Medicine I

Training and practice in identifying and responding to emergent situations. Includes CPR and AED training. Methods of instruction include assigned reading and experiential work.

*1 laboratory hour; 0.5 semester credit.*

CLINICAL SCIENCES 611

### Introduction to Pathology

The pathology I lecture/lab series introduces the student to the fundamental basis of disease by studying pathophysiology on both cellular and genetic scales. Such studies include cell death and adaptation, inflammation, tissue regeneration and fibrosis, hemodynamic disorders, neoplasia, genetic diseases, and infectious disease. Each pathophysiologic process studied is placed in a clinical context by reviewing associated physical, radiographic, gross, and microscopic findings. Laboratory exercises require the student to apply information acquired in lecture to various clinical scenarios that are more frequently encountered in practice. The course concludes with the beginning of the study of diseases by organ system. Prerequisites: NBS 512, NBS 513, NBS 521, NBS 522, NBS 524, NBS 525, NBS 526

*4 lecture hours, 1 laboratory hour; 4.5*

*semester credits*

CLINICAL SCIENCES 612

### Clinical, Physical and Laboratory Diagnosis I

This course applies the knowledge of pathol-

## Naturopathic Medicine

ogy, physical exam, and laboratory testing to develop the skills necessary to determine appropriate diagnoses for patients manifesting the signs and symptoms of disease. The material is covered for each organ system with an emphasis on the integration of information from multiple systems. Prerequisites: NBS 512, NBS 513, NBS 521, NBS 522, NBS 524, NBS 525, NBS 526

*6 lecture hours, 6 semester credits*

CLINICAL SCIENCES 612L

### Physical Examination Lab I

This lab course focuses on the development of physical examination skills, including the competent use of medical instrumentation. Students become proficient in the comprehensive examination of each body system, including relevant specialized tests. Students develop medical reasoning and decision-making skills as they learn to differentiate between normal and abnormal physical findings and begin to assess which diagnostic procedures are appropriate based on the patient's history and medical concerns. This course is offered in conjunction with other courses in laboratory and clinical diagnosis, creating a solid foundation for the development of clinical judgment. Lab Fee. Co-requisite NCS 612

*2 laboratory hours, 1 semester credit*

CLINICAL SCIENCES 613L

### Laboratory Diagnosis Lab I

In this course students will learn to perform in-office laboratory procedures including venipuncture. Co-requisite: NCS 612.

*1 laboratory hour; 0.5 semester credit*

CLINICAL SCIENCES 616

### Immunology

This course covers specific and non-specific components of the human immune system and the role played by each in protection from microbes and non-living agents. Hypersensitivity reactions, immunodeficiency, autoimmune diseases, immune responses to cancer and psychoneuro-immunology are also discussed. Prerequisites: NBS 525, NBS 522

*2 lecture hours; 2 semester credits*

CLINICAL SCIENCES 617

### Medical Genetics

This course covers the basis, the diagnosis, and the transmission of chromosomal and genetic disorders. The role of genetics and disease and the prenatal diagnosis of genetic and chromosomal abnormalities will be discussed. Special emphasis will be placed on preparing the students to recognize potential

genetic abnormalities in a clinical setting, on methodologies to educate and inform patients on the genetic basis of their particular disease and on the resources available for additional testing, treatment or counseling. Prerequisites: NBS 515, NBS 521, NBS 525

*1 lecture hour; 1 semester credit*

CLINICAL SCIENCES 619

### Introduction to Diagnostic Imaging

This course covers radiographic anatomy and imaging techniques. A basic introduction to imaging, including radiography, computer tomography (CT), magnetic resonance imaging (MRI), ultrasound, and bone scan (scintigraphy) is discussed. The basic concepts of these techniques and their use in diagnosis are discussed. This course will also cover basic radiographic anatomy of the skeletal system and viscera. Co-requisites: NCS 611.

*2 lecture hours; 2 semester credits*

CLINICAL SCIENCES 621

### Pathology and Diagnostic Imaging

This course continues the training of the fundamental basis of disease by studying pathophysiology on both organ system and multiorgan system scales. Organ systems studied include the cardiovascular, respiratory, urogenital, gastrointestinal, endocrine, musculoskeletal, and central nervous systems. Each pathophysiologic process studied is placed in a clinical context by reviewing associated physical, radiographic, gross, and microscopic findings. After completing this course curriculum, the student's comprehension of clinical textbooks should be self-perpetuating. Prerequisite: NCS 611

*5.5 lecture hours; 5.5 semester credits*

CLINICAL SCIENCES 622

### Clinical, Physical and Laboratory Diagnosis II

Continued integration of pathology, physical exam, and laboratory testing for appropriate diagnosis and treatment. Prerequisite: NCS 612.

*6 lecture hours; 6 semester credits*

CLINICAL SCIENCES 622L

### Physical Examination Lab II

This course is a continuation of Physical Examination I. Students will complete the process of learning physical examination skills for all systems of the human body. Pre-requisite: NCS-612L. Co-requisite NCS 622

*2 laboratory hours; 1 semester credit*

CLINICAL SCIENCES 623L

### Laboratory Diagnosis Lab II

In this course, students learn all the steps of performing laboratory procedures: pre-test pa-

tient instruction, filling out requisition forms, specimen collection, venipuncture, capillary blood collection, saliva and urine collection, specimen handling and processing, and interpretation of results. Students will learn sources of laboratory errors and be able to minimize error potential. They will also learn conventional and alternative labs for various organ systems. This course is a continuation of Laboratory Diagnosis Lab I. Pre-requisite: NCS-613L. Co-requisite: NCS 622.

*1 laboratory hour; 0.5 semester credit*

CLINICAL SCIENCES 714

### Clinical Forum I

This course explores the clinical applications of the basic sciences and the clinical courses taught concurrently in this semester. Case presentations and clinical skills are emphasized through a problem based learning format using naturopathic principles as the foundation.

*1 lecture hour; 1 laboratory hours 1.5 semester credits*

CLINICAL SCIENCES 721

### Pharmacology I

Dose response relationships, pharmacokinetics, pharmacodynamics, pharmacogenetics, drug toxicity, signal transduction and second messengers are covered. Drug interactions, indications/contraindications, food/herb interactions are discussed. The pharmacology and toxicology of the drugs of the nervous, respiratory and cardiovascular systems will be examined. Prerequisites: NBS 514, NBS 515, NBS 524, NBS 525

*2 lecture hours; 2 semester credits*

CLINICAL SCIENCES 723

### Clinical Forum II

This course is a continuation of Clinical Forum I. It further explores the clinical applications of the basic sciences and the clinical courses taught concurrently in this semester. Case presentations and clinical skills are emphasized through a problem based learning format using naturopathic principles as the foundation.

*2 laboratory hours; 1 semester credit*

CLINICAL SCIENCES 724

### Emergency Medicine II

This course focuses on identification of emergency situations and procedures, particularly as they present in ambulatory care and general practice. The course includes discussion, demonstration, and practice of treating patients within the scope of practice. Quick response

# Naturopathic Medicine

and decision-making process for referral of the patient for treatment.

*2 lab hours; 1 semester credit*

CLINICAL SCIENCES 811

## Pharmacology II

This course, a continuation from Pharmacology I, examines the most common pharmaceutical agents in clinical practice and the ones most likely to be encountered in a clinical setting in general practice. It reviews antibiotics, antimicrobials, both steroidal and non-steroidal anti-inflammatory agents, chemotherapeutic agents, hormones, and commonly prescribed medications. Prerequisite: NCS 721.

*2 lecture hours; 2 semester credits*

CLINICAL SCIENCES 812

## Environmental Medicine

This course focuses on the health effects of pollutants in the home, workplace as well as in the air, water, earth, and food supply. Diagnosis and treatment of health conditions caused by these pollutants is covered with special emphasis on treating the chemically sensitive patient or those with environmental illness. Prerequisites: NCS 621, NCS 622

*1 lecture hour; 1 semester credit*

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## Naturopathic Practice/Organ Systems

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NATUROPATHIC PRACTICE 621

### Introduction to Biochemical Individuality

This survey course introduces the naturopathic student to the basics of personalized medicine and nutrigenomics.

*1 lecture hour; 1 semester credit*

NATUROPATHIC PRACTICE 712

### Generative Medicine I (Elective)

This course examines the basics of complexity theory and systems biology as applied to naturopathic strategies, in particular the vis medicatrix naturae. Students who wish to qualify for senior shift positions on the Center of Excellence in Generative Medicine (COEGM) Personalized Medicine shifts will be required to take Generative Medicine I. Students who wish to qualify (upon licensure) to sit for the board certification (diplomate) in Personalized Medicine through the AANP affiliated Institute for Naturopathic Generative Medicine are required to take Generative Medicine I and Generative Medicine II. Students who wish to qualify for post-graduate residencies at the COEGM are required to take Generative Medicine I and Generative Medicine II. Pathfinder Scholars are required to take Generative Medi-

cine I and Generative Medicine II.

*1 lecture hour; 1 semester credit*

NATUROPATHIC PRACTICE 713

### Gastroenterology

This course examines the digestive tract and associated organs, and disorders associated with it. Physical examination, imaging, and laboratory techniques necessary to understand and diagnose these disorders are discussed along with their naturopathic treatment. Prerequisites: NCS 621, NCS 622, NCS 623L.

*2 lecture hours; 2 semester credits*

NATUROPATHIC PRACTICE 714

### Naturopathic OB/Gyn

This course synthesizes concepts of female anatomy, physiology, and pathophysiology and applies them to clinical conditions. Physical exam, laboratory and diagnostic evaluation, and clinical diagnosis are presented for major clinical conditions. Students will be prepared to discuss normal preconception, pregnancy, and postpartum-related concerns with their patients and to competently attend unplanned, emergent, but normal deliveries. Scope of practice, consultation, and referral requirements will be discussed. Naturopathic treatment of commonly encountered gynecological and obstetrical issues is included. Prerequisites: NCS 621, NCS 622.

*3 lecture hours; 3 semester credits*

NATUROPATHIC PRACTICE 721

### Pediatrics

Upon completion of this course the student will be able to recognize and diagnose the conditions of the pediatric patient encountered in a general naturopathic practice. Naturopathic therapy and management of these disorders are discussed along with the appropriate use of referral. Prerequisites: NCS 621, NCS 622, NCS 623L.

*2 lecture hours; 2 semester credits*

NATUROPATHIC PRACTICE 722

### Cardiology

This course covers the pathophysiology, advanced diagnosis, and treatment of cardiovascular diseases. Both conventional and naturopathic therapies are covered. Upon completion students will be able to apply this knowledge to the care of patients with cardiac disease and know when to refer for specialized diagnosis and treatment. Prerequisites: NCS 621, NCS 622, NCS 623L.

*2 lecture hours; 2 semester credits*

NATUROPATHIC PRACTICE 725L

### Gynecology Lab

Physical examination practicum relevant to gy-

necology, including breast and pelvic exams. Prerequisite: NNP 714.

*1 laboratory hour; 0.5 semester credit*

NATUROPATHIC PRACTICE 811

### Eye, Ear, Nose and Throat

The diagnosis and naturopathic and traditional treatment of diseases of the eyes, ears, nose, and throat are discussed. Upon completion of this course students will be able to diagnose common and important diseases, know when to refer patients for specialty diagnosis and treatment, and will be able to apply naturopathic principles and modalities in case management. Prerequisites: NCS 621, NCS 622, NCS 623L.

*0.5 lecture hour; 0.5 laboratory hour; 0.75 semester credit*

NATUROPATHIC PRACTICE 828

### Generative Medicine II (Elective)

This survey course introduces the naturopathic student to the basics of generative medicine as envisioned and practiced at the Center of Excellence in Generative Medicine. Topics include: Advanced network theory, generative molecular biology, computational medicine, information theory and bioinformatics. Students who wish to qualify for senior shift positions on the Center of Excellence in Generative Medicine (COEGM) Personalized Medicine shifts will be required to take Generative Medicine I. Students who wish to qualify (upon licensure) to sit for the board certification (diplomate) in Personalized Medicine through the AANP affiliated Institute for Naturopathic Generative Medicine are required to take Generative Medicine I and Generative Medicine II. Students who wish to qualify for post-graduate residencies at the COEGM are required to take Generative Medicine I and Generative Medicine II. Pathfinder Scholars are required to take Generative Medicine I and Generative Medicine II. Prerequisite: NNP 712

*1 lecture hour; 1 semester credit*

NATUROPATHIC PRACTICE 812

### Endocrinology

This course covers the diagnosis and naturopathic and traditional management of diseases and imbalances of the endocrine system. Upon completion, students will be able to recognize and diagnose hormonal disorders, know when to refer patients for specialty diagnosis and treatment, and be able to apply naturopathic principles and modalities in endocrine case management. Prerequisites: NCS 621, NCS 622, NCS 623L.

*2 lecture hours; 2 semester credits*

# Naturopathic Medicine

## NATUROPATHIC PRACTICE 813

### Neurology

This course constitutes a review of the neurological exam with emphasis on diagnosis of neurological conditions. It will include naturopathic treatment and management of diseases of the nervous system as they are discussed. Prerequisites: NBS 526, NCS 621, NCS 622, NCS 623L.

*1.5 lecture hours; 1.5 semester credits*

## NATUROPATHIC PRACTICE 814

### Urology/Proctology

This course covers disorders of the urinary system, male genitalia, and the anal-rectal region. Diagnosis and conventional and naturopathic management of cases are covered. Prerequisites: NCS 621, NCS 622, NCS 623L.

*1 lecture hour; 1 semester credit*

## NATUROPATHIC PRACTICE 821

### Geriatrics

This course covers the aging process and the new field of anti-aging medicine. Conventional geriatrics topics are discussed as well as topics on geriatric illnesses and their naturopathic interventions. Prerequisites: NCS 621, NCS 622, NCS 623L.

*1 lecture hour; 1 semester credit*

## NATUROPATHIC PRACTICE 823

### Oncology

This course covers the diagnostic, prognostic and preventative and epidemiological information for common cancers. Various theories of cancer are discussed as well as both traditional and non-traditional treatments. Case studies are used to help cement the concepts covered in relation to various malignancies. At the conclusion of this course students will be prepared to screen for common cancers and co-manage patients with cancer. Prerequisites: NCS 621, NCS 622, NCS 623L.

*1.5 lecture hours; 1.5 semester credits*

## NATUROPATHIC PRACTICE 824

### Dermatology

The diagnosis and treatment of diseases which manifest in skin lesions are discussed. Naturopathic treatment and prevention are taught. Prerequisites: NCS 621, NCS 622, NCS 623L.

*1.5 lecture hours; 1.5 semester credits*

## NATUROPATHIC PRACTICE 825

### Minor Office Procedures

Minor surgical procedures as defined by the scope of practice for naturopathic physicians are taught. The course covers common minor surgery office procedures such as suturing techniques, wound care, local anesthesia, and bandaging techniques. Topics also include

recognizing and treating infection, burns, and conditions requiring referral for surgical intervention. Prerequisite: NCS 622.

*1 lecture hour; 1 laboratory hour; 1.5 semester credits*

## NATUROPATHIC PRACTICE 826

### Rheumatology

This course explores the structure and function of the musculoskeletal, connective tissue, lymphatic, vascular, and immunologic systems as they pertain to rheumatologic health and disease. Emphasis is placed on prevention, screening, diagnosis, and treatment of rheumatologic symptoms and conditions. Prerequisites: NCS 621, NCS 622, NCS 623L.

*1 lecture hour; 1 semester credit*

## Naturopathic Principles and Practice

### PRINCIPLES AND PRACTICE 512

#### History and Philosophy of Naturopathic Medicine

This course will explore the philosophical foundations of naturopathic medicine, which form the basis for therapeutic intervention. Vitalistic medicine in the United States of America as an influence on the creation of the naturopathic profession will be discussed. The overall emphasis of the course will be on the philosophical principles that define the empirical "natural laws" which describe the phenomenon of healing. The relationship of naturopathic principles to medical science is included. This course will also examine the historical, socioeconomic, and political foundations of Naturopathic Medicine and its eclectic blend of healing arts and fundamental roots; Botanical Medicine, Nature Cure, Physical medicine, Hydrotherapy, Homeopathy, Energy Medicine, and Ancient Healing systems from around the globe.

*2.5 lecture hours; 2.5 semester credits*

### PRINCIPLES AND PRACTICE 513

#### Medical Ethics

An introduction to the principles of medical ethics. Provides a basis for the discussion of therapeutic choices and the role of the doctor in difficult medical decisions that will be reinforced throughout clinical studies. Learning strategies include lecture, discussion, assigned reading and written reflection. Prerequisites: None. Required for: Public Health I, Psychological Assessment, Clinical Practicum I.

*0.5 lecture hour; 0.5 semester credit*

### PRINCIPLES AND PRACTICE 711

#### Practice Management I

Students are taught procedures for the establishment and operation of a private practice. Practical aspects of small business management are discussed. Students are encouraged to begin thinking about their personal career path in naturopathic medicine. Prerequisites: NCS 611, NCS 612, NCS 613, NCS 621, NCS 622, NCS 623.

*1 lecture hour; 1 semester credit*

### PRINCIPLES AND PRACTICE 722

#### Philosophy of Naturopathic Medicine II

Nature acts powerfully through healing mechanisms in the body and mind to maintain and restore health. Students will receive a more in-depth utilization of naturopathic methods and medicinal substances, which work in harmony with the human system, thus facilitating long-lasting health and recovery. In addition to employing various natural medicines, students will gain an important perspective of the vital force and its role in the healing process when used in conjunction with naturopathic principles. Prerequisite: NPP 512.

*1 lecture hour; 1 semester credit*

### PRINCIPLES AND PRACTICE 813

#### Fundamentals of Entrepreneurship

This course will begin by addressing the concepts of entrepreneurship and developing a new venture. The course will address fundamentals such as the types of financing important to the new venture and the finances of its creator, competitive positioning, branding and imaging, stationery, marketing, protecting intellectual property, the legal entity structure, the website development components and cost, insurance, labor and sales and use tax along with basic HR requirements. The class will learn how to source capital and then further how to pitch to capital providers. Each student will develop a minimum viable product by producing a business model canvas.

*3 lecture hours; 3 semester credits*

### PRINCIPLES AND PRACTICE 821

#### Medical Jurisprudence

The course covers the basics of law as it applies to medical practice, informed consent, confidentiality, and professional liability. Naturopathic practice in licensed and unlicensed states will be discussed, as well as an in depth review of the practice act in Connecticut. The ethical practice of naturopathic medicine will also be discussed. Prerequisites: NCS 621, NCS 622, NCS 623.

*0.5 lecture hour; 0.5 semester credit*

### PRINCIPLES AND PRACTICE 822

#### Practice Management II

## Naturopathic Medicine

This course introduces the student to the business procedures and practice used in the successful operating of a naturopathic practice. Prerequisite: NPP 711.

*2 lecture hours; 2 semester credits*

PRINCIPLES AND PRACTICE 823

### Applied Medical Ethics

Medical ethics with an emphasis on the unique problems faced by the naturopathic physician. Topics include patient autonomy and choice, selection of appropriate therapies, and coordination of patient care with practitioners from other disciplines. Learning strategies include lecture, discussion, group work, assigned reading, and written reflection. Prerequisites: NPP 513, completion of basic science classes and passed Clinic Promotion Exam.

*0.5 lecture hour; 0.5 credit*

## Homeopathic Medicine

HOMEOPATHIC MEDICINE 621

### Homeopathy I

This course lays the foundation of the basic laws and principles of Homeopathy upon which future courses will build. The principles as set forth by Hahnemann in his Organon are the bases of the course. The student will also become thoroughly acquainted with the use of Kent's repertory.

*2 lecture hours; 2 semester credits*

HOMEOPATHIC MEDICINE 711

### Homeopathy II

This course will continue the examination of Homeopathy, with emphasis on the concept of acute prescribing, case taking, and analysis. Students will continue their discussion and understanding of the drug pictures of the remedies for acute complaints commonly seen in a general or family practice. Prerequisite: NHM 621

*2 lecture hours; 2 semester credits*

HOMEOPATHIC MEDICINE 721

### Homeopathy III

Students will continue their study of the hierarchy of symptoms as they are expressed in the repertory and will begin to recognize the keynote symptoms of polycrest remedies and be able to distinguish among them. Computer repertorization is used throughout to illustrate the relative values of possible rubrics to include in a given case. Prerequisites: NHM 621, NHM 711

*2 lecture hours; 2 semester credits*

HOMEOPATHIC MEDICINE 821

### Homeopathy IV (Elective)

In this seminar-style course, students develop

a deeper understanding of homeopathic case-taking, analysis, prescribing and long-term case management strategies. Casework using video recordings, group discussions and computer repertorizations are employed to deepen the student's understanding of case analysis and management of chronic states. Students prepare to incorporate classical homeopathic treatment into their private practices. Prerequisites: NHM 621, NHM 711, NHM 721

*2 lecture hours; 2 semester credits*

## Traditional Chinese Medicine

NATUROPATHIC TRADITIONAL CHINESE MEDICINE 511

### NTCM I

The course sequence gives students the tools to integrate the basic philosophical concepts of TCM into naturopathic practice. In this introductory course, students will begin to apply TCM principles and medical philosophy to the human body. They will develop a basic understanding of the relationships between the TCM zangfu ("organs"), and of TCM modes of diagnosis, as found in the "Four Examinations" and "Eight Principles", including pulse, tongue, facial, palpation, and questioning techniques.

*2 lecture hours; 2 semester credits*

NATUROPATHIC TRADITIONAL CHINESE MEDICINE 521

### NTCM II

Students begin the study and practice of basic acupuncture and moxibustion techniques. Students will learn to identify meridians and acupuncture points. The basic tenets of clean needle technique and safe needle insertion as they relate to acupuncture will be covered. Students will learn and practice basic acupuncture protocols for common complaints. Prerequisite: NTCM 511.

*2 lecture hours; 2 semester credits*

*Further study in TCM may be taken through the Acupuncture Institute. Refer to the catalog section on Acupuncture.*

## Physical Medicine

PHYSICAL MEDICINE 522

### Living Anatomy: Palpation

This laboratory course introduces how to locate and palpate the bony landmarks, attachments/origins, and the superficial musculature of the entire body. It is an adjunct to the Anatomy courses and a precursor to the courses in physical medicine.

*1.5 laboratory hours; 0.75 semester credits*

PHYSICAL MEDICINE 523

### Hydrotherapy

This course introduces students to the physiological principles and the clinical application of the therapeutic use of water, heat, and cold. In the laboratory portion of this course, students learn procedures by administering and receiving treatments and determining appropriate applications. Prerequisite: NBS 511.

*1 lecture hour; 1.5 laboratory hours; 1.75 semester credits*

PHYSICAL MEDICINE 612

### Physiological Therapeutics

This course covers the physical, clinical, and contraindications of the use of heat, cold, high-volt galvanism, interferential current, low-volt galvanism, ultrasound, electrical muscle stimulation, diathermy, and paraffin. Upon completion, students will be able to use these modalities both individually and in conjunction with other therapies in the treatment of musculoskeletal and other disorders. Prerequisites: NBS 521, NBS 525.

*1 lecture hour; 1 semester credit*

PHYSICAL MEDICINE 612L

### Physiological Therapeutics Lab

Laboratory component of NPM 612 Physiological Therapeutics. Co-requisite: NPM 612. Prerequisites: NBS 521, NBS 525.

*2 laboratory hours; 1 semester credits*

PHYSICAL MEDICINE 621

### Orthopedic Assessment

Students in this course will learn to diagnose orthopedic injuries and diseases. Those conditions that can be safely treated in a general practice setting are distinguished from those requiring referral to a specialist. Prerequisites: NBS 511, NBS 515, NBS 521, NBS 525.

*1 lecture hour; 1 laboratory hour; 1.5 semester credits*

PHYSICAL MEDICINE 711

### Naturopathic Manipulative Therapeutics I

This course is a basic presentation of the principles and practices of manipulation of the axial spine. Lecture includes discussion of the neurological rationale for manipulation, as well as various methods of manipulation (both force and non-force techniques). Soft-tissue techniques such as Post-Isometric Relaxation Technique and Positional Release Technique will be discussed and taught in lab. Palpation, neurological and orthopedic evaluation will be performed prior to any manipulative procedures. Prerequisite: NPM 621

*1 lecture hours; 3 laboratory hours; 2.5 semester credits*

PHYSICAL MEDICINE 721

# Naturopathic Medicine

## Naturopathic Manipulative Therapeutics II

This course will extend NPM711 by introducing principles and biomechanics of extremities as well as gait analysis. Non-force techniques such as Sacral-Occipital Technique (SOT) and Cranial-Sacral Techniques will be reviewed.

Prerequisite: NPM 711

1 lecture hour; 3 laboratory hours; 2.5 semester credits

PHYSICAL MEDICINE 821

## Therapeutic Exercise/Sports Medicine

This course provides an overview of exercise as a preventative and therapeutic tool. Students will learn to perform a fitness assessment and describe and monitor exercise programs for persons with a variety of common disease conditions as well as treatments for sports injuries.

Prerequisite: NPM 721

2 lecture hours; 2 semester credits

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## Psychology

PSYCHOLOGY 511

### Physician Self-Care

This course highlights the importance of self-reflection and self-care for those training to be Naturopathic Physicians. Students will explore the multidimensional aspects of health, the impact of stress on health, and effective strategies and tools for managing stress and attending to one's health in a truly holistic manner. Introspective work and in-class discussions and exercises will be done.

1 laboratory hour; 0.5 semester credit

PSYCHOLOGY 501

### Counseling Skills I

This course provides an introduction to developing the naturopathic practitioner/patient relationship via the development of communication skills. Professional issues such as ethics, confidentiality, trust, appropriate boundaries, and relationship building are included. Specific communication skills related to effective patient interviewing are practiced experimentally using exercises in class. Students practice the skills of attending, empathy, active listening, and focusing on important client concerns to identify and begin collaborative goal setting.

1 lecture hour; 1 laboratory hour; 1.5 semester credits

PSYCHOLOGY 621

### Psychological Assessment

This course covers the diagnosis of psychiatric disorders according to the Diagnostic

and Statistical Manual of Mental Disorders. Included is the development of the DSM, psychological assessment considerations, referral options, and treatment modalities including psychotherapeutic, psychotropic, and alternative interventions. Special attention is paid to addictions and eating disorders. Prerequisite: NPS 501.

2 lecture hours; 2 semester credits

PSYCHOLOGY 711

### Counseling Skills II

This course introduces current holistic counseling theories and interventions through lectures, assignments, readings, and experimental exercises. Counseling skills with reference to actual cases are explored using problem-based learning methods. Students will demonstrate basic interviewing techniques and strategies for engaging and motivating the client through reciprocal dialogue during the developmental stages of a counseling relationship. This course emphasizes the basic counseling skills required of a physician in daily practice, in addition to the special circumstances of bereavement, crisis management, and chronic and terminal illness. Prerequisites: NPS 501.

1 lecture hour; 1 laboratory hour; 1.5 semester credits

PSYCHOLOGY 813

### Mind-Body Medicine

This course covers key issues in the relationship between a physician and client. It includes an examination of ethical issues, confidentiality, and development of trust, setting appropriate boundaries, and dealing with patients with a variety of conditions. Prerequisites: NPS 501, NPS 621, NPS 711.

1 lecture hour; 1 semester credit

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## Research

RESEARCH 511

### Research

This course introduces students to biomedical research principles, epidemiology, biostatistics, and accessing medical literature with an emphasis on complementary and alternative medicine research.

2 lecture hours; 2 semester credits

RESEARCH 711

### Thesis I

In this course the student performs a litera-

ture search in a naturopathic area of interest and presents a proposal for a Senior Paper (literature survey only) or a Senior Research Paper (also includes original research). Each student chooses a faculty advisor for their thesis. Original research must be approved by the Research Committee. Prerequisite: NRS 511.

0.5 lecture hour; 0.5 semester credit

RESEARCH 811

### Thesis II

With the advice and guidance of the thesis advisor, the student prepares and submits a complete first draft of a Senior Paper in conformity with the guidelines adopted by the Research Committee. Prerequisite: NRS 711.

0.5 lecture hour; 0.5 semester credit

RESEARCH 822

### Thesis III

With the advice and guidance of the thesis advisor, the student makes revisions to the first draft and submits a final version of the Senior Paper. Students may also be required to present their papers before a committee of faculty advisors. Prerequisite: NRS 811.

0.5 lecture hour; 0.5 semester credit

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## Clinical Education

CLINICAL EDUCATION 612

### Introduction to Clinic

This course introduces students to the clinical education component of the program. Clinical education requirements, policies, and protocols, are outlined. Students are introduced to hands-on patient care skills, such as taking a brief history and assessing vital signs. Other topics include privacy and security of patient information (HIPAA), cultural competence, doctor/patient communication skills, and professionalism.

0.5 lecture hour; 0.5 semester credit

CLINICAL EDUCATION 631

### Clinical Practicum I

Through clinical observation and hands-on experience, this course prepares students for their clinical education. Students will shadow staff and physicians in the clinical environment, and when directed will assist with tasks and patient care. Students will gain hands on experience with electronic medical records (EMR), will be required to take vitals, and assist in hydrotherapy treatments. Prerequisite: NCE-612

1 laboratory hour; 0.5 semester credit

CLINICAL EDUCATION 641

### Clinical Practicum II

## Naturopathic Medicine • Nutrition

A continuation of Clinical Practicum I. Through clinical observation and hands-on experience, this course prepares students for their clinical education. Students will shadow staff and physicians in the clinical environment, and when directed will assist with tasks and patient care. Students will gain hands on experience with electronic medical records (EMR), will be required to take vitals, and assist in hydrotherapy treatments. Prerequisite: NCE-631

*1.5 laboratory hours; 0.75 semester credit*

CLINICAL EDUCATION 821I

### **Practicum in IV Therapy (Elective)**

The student will learn the indications and contraindications for various IV therapies in the naturopathic practice. Preparation and administration (including osmolality) of various IV solutions using proper aseptic techniques will be emphasized. Lectures will be accompanied by hands-on in-class experience. Prerequisites: NCS 623L, must be eligible for clinic entry.

*0.5 lecture hour; 1 laboratory hour; 1 semester credit*

CLINICAL EDUCATION 861

### **Externship (Elective)**

Students gain hands-on clinical experience in working with patients under the supervision of a naturopathic physician outside of UB Clinics. The externship experience mimics that of the UB Clinics experience, in that students are actively involved in patient care, participating in the diagnosis and treatment of patients. Pre-requisites: Completion of all Preceptorship hours, and a minimum of 100 hours clinical experience as a Primary Student Clinician in the UB Clinics and Community Clinics.

## *Types of Clinical Rotations Offered*

### **700-LEVEL CLINICAL ROTATIONS**

As Secondary Student Clinicians, students begin to gain practical clinical skills by working under the supervision of licensed health care providers. Students learn primarily through observation and are given limited responsibility in the clinical setting during the fall semester. Performance objectives are focused on basic clinical procedures. In the spring semester of their third year, Secondary Student Clinicians continue the clinical training begun in the fall, which includes the ongoing development of clinical skills and case management under the supervision of licensed physicians. Students gradually assume increased responsibility.

### **800-LEVEL CLINICAL ROTATIONS**

As Primary Student Clinicians, students assume the role of primary care giver under the direct supervision of a licensed physician. Physical examination, diagnostic assessment, and treatment skills are honed while specific performance objectives of clinical training are met. In this final semester of clinical training, students examine, diagnose, and treat patients in preparation for providing primary care as a naturopathic physician.

CLINICAL EDUCATION 635

### **Hydrotherapy Shift**

Second year students begin to gain practical clinical skills in the area of hydrotherapy by working under the supervision of licensed naturopathic physician. Hydrotherapy techniques include constitutional hydrotherapy, infrared sauna, wet sheet pack, Russian steam, fomentations, contrast baths, peat baths, and paraffin baths. Performance objectives are focused on basic hydrotherapy treatments and case management. Prerequisites: NPM 523; successful completion of all Year 1 courses.

*24 clinic hours, 0.67 semester credit*

CLINICAL EDUCATION 700/800

### **General Medicine**

Students begin to gain practical clinical skills by working under the supervision of licensed health care providers. Students learn through observation with progressively increasing responsibility in the clinical setting. Students perform physical exams, diagnostic assessments, and develop treatment programs for patients with a wide variety of health conditions.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 701/801

### **Pediatrics**

Students perform physical exams, diagnostic assessments and develop treatment programs for pediatric patients under the supervision of licensed health care providers, integrating biomedical science with natural therapeutics.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 702/802

### **Integrative Oncology**

Students learn to approach oncology cases by performing a review of biomedical findings and integrating best practices in natural therapeutics. Students co-manage patients' healthcare with their specialists to address their cancer diagnosis and to minimize adverse effects that may arise from their treatment.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 703/803

### **Generative Medicine**

Students learn how to use the methods of network science to understand the complex relationships between individuals, their genetics, the environment, and the molecular basis of disease to develop treatment strategies aimed at optimizing health for each individual patient, utilizing specialized computer tools and a comprehensive knowledge of genetics, pathology, and biochemistry.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 705/805

### **Mind-Body Medicine**

Under the supervision of licensed health care providers, students develop trust, set appropriate boundaries, and using counseling tools, they work with patients by addressing their social and emotional concerns.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 706/806

### **Physical Medicine**

Students perform physical exams, diagnostic assessments, and develop and apply treatment approaches using a variety of therapeutic tools for patients with musculoskeletal concerns.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 707/807

### **Homeopathy**

Students gain practical experience working with patients and using repertorization software and texts, homeopathic Materia Medica, and practical application for individuals with acute, chronic, and constitutional concerns.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 708/808

### **Community Medicine**

Students perform physical exams, diagnostic assessments, and develop and apply treatment approaches in a variety of community settings.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 709/809

### **Women's Health**

Students perform physical exams, diagnostic assessments and develop and apply treatment approaches directed at health concerns related to women's health.

*72 clinic hours, 2 semester credits*

CLINICAL EDUCATION 714

### **Clinic Mentoring**

Supervising Clinicians model the process of case-taking and management as students develop physical exam and diagnostic assessment skills, as well as treatment approaches through their increasingly active participation in the patient visit.

## Nutrition

72 clinic hours, 2 semester credits

CLINICAL EDUCATION 888

### **Integrative Medicine**

This rotation is a collaborative effort of the College of Naturopathic Medicine, the College of Chiropractic, the Acupuncture Institute, and the Fones School of Dental Hygiene. The focus of this rotation is on prevention and improving patients' health globally. Student Clinicians/ Supervisors from all four schools interview the patient and write case study reports after each encounter, with the inclusion of evidence-informed clinical practice information in the global assessment.

72 clinic hours, 2 semester credits

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## Nutrition

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### Nutritional Science

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The following nutritional science courses are offered only in the master's program in Nutrition. This program is available on the main campus and online.

560A	Pathophysiologic Basis of Metabolic Disease
560B	Biochemistry of Nutrition
560C	Vitamins and Minerals
560E	Assessment of Nutritional Status
560D	Clinical Biochemistry
560G	Lifelong Healing with Food
560H	Developmental Nutrition
560I	Functional Medicine Nutrition
560F	Nutritional Therapeutics
560M	Evidence Based Nutrition
560K	Virtual Cliinic
560P	Botanical Medicine

NUTRITION 560A

#### **Path physiologic Basis of Metabolic Disease**

A study of the underlying mechanisms of disease and the complex interrelationships between critical systems including respiratory, urinary, cardiovascular, digestive, nervous and endocrine. Lectures will include fluid and electrolyte imbalances, acid and base imbalances, inflammation, hypersensitivity, infection, necrosis, and neoplasms. The influence of various nutrients on systemic function will be stressed. Prerequisite: Anatomy & Physiology I, II, NUTR 560A, 560B, 560C, 560D, 560E, 560F, 560G, 560H, 560I,560J, 560M, 560P.

4 semester hours

Offered: Twice Annually

NUTRITION 560B

#### **Biochemistry of Nutrition**

The course reviews the static and dynamic aspects of the biochemistry of carbohydrates, lipids, amino acids, proteins, nucleic acids, hormones and vitamins in the healthy individual. Cations, anions, enzyme kinetics, and integration and control mechanisms of the various metabolic pathways are discussed. Prerequisite 4 credits of Introduction to Biochemistry or 8 credit of Organic Chemistry.

4 semester hours

NUTRITION 560C

#### **Vitamins and Minerals**

The course covers the basic and clinical aspects of nutrient homeostasis with emphasis on vitamin and mineral metabolism at the cellular and tissue level. Lectures will include specific functions, requirements, sources, assay methods, and effects of deficiencies and excesses of vitamins and minerals. Prerequisite: Nutrition 560A and 560B.

3 semester hours

NUTRITION 560E

#### **Assessment of Nutritional Status**

Clinical and laboratory procedures for evaluation of nutrient status, including blood and other tissue analyses, principles of functional assessment, dietary records, questionnaires, case histories, physical examinations, and anthropometric methods are covered extensively. Prerequisite Nutr 560A and 560B.

3 semester hours

NUTRITION 560D

#### **Clinical Biochemistry**

The course encapsulates the biochemistry of disorders arising from acid/base imbalance and the abnormal metabolism of the carbohydrates, lipids, proteins, amino acids, nucleic acids, bile pigments, vitamins and hormones. Inherited disorders of metabolism, the role of enzyme performance in prognosis of biochemical dysfunctions and the meaning and interpretations of clinical laboratory findings both traditional and functional are discussed. Prerequisite Nutr 560A , B, C and E

3 semester hours

NUTRITION 560G

#### **Lifelong Healing with Food**

This course will focus on the general knowledge and skills needed to educate nutrition clients about food to facilitate healing . It will teach the landscape of the US food system, menu and recipe planning, , multiple food theories, fad and medical diets. Cultural and behavioral perspectives on nutrition will be addressed. Pre-requisite Nutr 560 A B C and E.

4 semester hours

NUTRITION 560H

#### **Developmental Nutrition**

Nutritional considerations and health-related concerns throughout the life cycle are explored. Pregnancy, lactation, fetal, infancy, childhood, and adolescent growth and development are addressed in detail, in this context. Also considered is the etiology of nutrition-related disorders of adulthood and the elderly. Prerequisites Nutr 560A, B, C ,D and E

3 semester hours

NUTRITION 560I

#### **Functional Medicine Nutrition**

This course will teach advanced biochemical assessment using critical analysis of client history with clinical testing from a functional medicine perspective. Functional lab testing will be evaluated in detail with case studies. Topics will be relevant to preventative as well as therapeutic nutrition care. Prerequisites Nutr 560A, B, C, D, E, G.

3 semester hours

NUTRITION 560F

#### **Nutritional Therapeutics**

This course will include an understanding of the mechanism of action of various nutritional interventions, as well as the role it can play in helping to restore wellness. Students will become familiar with common pharmaceutical treatments, and become aware of possible drug-nutrient interactions, as well as drug-induced nutrient depletions. Students will learn how to incorporate nutrition in a complimentary role with conventional treatments. This course will emphasize the importance of incorporating evidence based medicine into nutritional therapeutic decisions. Prerequisites Nutr 560A,B,C,D,E,G,H I.

4 semester hours

NUTRITION 560M

#### **Evidence Based Nutrition (Must be taken in online format)**

The course describes the analytical approaches for searching and interpreting clinical research data reported in the literature using evidence based practice with emphasis on the application of those data in clinical practice. Biological variation, experimental design, data and fact differences, matching analysis to design, integrity in analysis, and bias in design and analysis are considered in detail. Prerequisites Nutr 560A,B, C,and E

3 semester hours

## Nutrition • Physician Assistant

NUTRITION 560K

### **Virtual Clinic (Must be taken in online format)**

This final semester course will incorporate critical thinking and scientific knowledge as you complete 4 monthly modules on clinical management online with different instructors. You will learn key skills in assessment, clinical test analysis, designing treatment plans for specific common health conditions, weight loss strategies and how to effectively start and grow your nutrition practice. Synchronous data technology will be used to help you learn real-time with your classmates and instructors. Prerequisites Nutr 560A, B, C, D, E, G, F, H, I and M.

*4 semester hours*

NUTRITION 560P

### **Botanical Medicine**

A study of the use of herbs in nutritional practice. Lectures include the mechanism of action, pharmacological/toxicological properties, clinical applications, product standardization, and recommended dosage of individual herbs. Prerequisites Nutr 560A, B, C, D, E, G, F, H, I and M.

*3 semester hours*

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## **Elective Courses\***

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THESE COURSES ARE NOT REQUIRED /ALL ARE OPTIONAL AND IN ADDITION TO REQUIRED COURSES.

NUTRITION 560J

### **Research in Nutrition**

The independent research project is an option in the Human Nutrition program in place of an elective course. The project can take the form of a literature-based study or an original research project. All work must be done by the student. The topic must be approved by the faculty advisor. The project must be completed within one semester following the completion of the core curriculum.

*3 semester hours*

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## **Physician Assistant (MSPA)**

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PHYSICIAN ASSISTANT 511

### **Anatomy I with Lab**

This course introduces the functional anatomy of the human body. Students will have the opportunity to locate, identify, and dissect all major muscular, nervous, vascular, bony, and soft tissue structures using cadaveric specimens.

*3 credits*

PHYSICIAN ASSISTANT 512

### **Anatomy II with Lab**

This course builds on Anatomy I investigating the functional anatomy of the human body by offering students the opportunity to locate, identify, and dissect all major muscular, nervous, vascular, bony, and soft tissue structures using cadaveric specimens.

*3 credits*

PHYSICIAN ASSISTANT 521

### **Physiology I**

This course offers fundamental and integrated approach to human physiology and biochemistry starting with basic processes of metabolism and homeostasis including carbohydrate, lipids and protein metabolism, cell cycle and DNA replication, cellular energy production, tissue types and their functions. This course presents an in-depth exploration of the nervous system, musculoskeletal functioning and cardiac physiology.

*3 credits*

PHYSICIAN ASSISTANT 522

### **Physiology II**

This course builds on MSPA 521 to offer a fundamental and integrated approach to the circulatory, pulmonary, gastrointestinal and endocrine systems. The circulatory system will highlight regulation of local flow, Starling forces equilibrium and function of lymphatics. The pulmonary system will cover ventilation, perfusion and gas exchange processes. The GI system will address details of nutrient digestion, peristalsis, secretion and absorption processes as well as autonomic nervous system impact on regulation of GI tract. The endocrine system will discuss hormones and the types of receptors they affect.

*3 credits*

PHYSICIAN ASSISTANT 529

### **Clinical Medicine I**

The first of a three-semester series, this course is an organ-systems-based exploration of psychiatric, neurologic, hematologic and dermatologic diseases, as well as diseases of the head, eyes, ears, nose, and throat. Emphasis is on the integration of anatomy, physiology, pathophysiology, microbiology, history and exam findings and diagnostic procedures in order to formulate a differential diagnosis; on ordering and interpreting diagnostic tests in order to develop a working diagnosis; and on developing and implementing treatment plans including as needed therapeutic procedures, pharmacology, referral and patient education and counseling.

*5 credits*

PHYSICIAN ASSISTANT 530

### **Clinical Medicine II**

The second of a three-semester series, this course is an organ-systems-based exploration of cardiac, pulmonic, gastrointestinal genitourinary, endocrine, and renal, diseases. Emphasis is on the integration of anatomy, physiology, pathophysiology, microbiology, history and exam findings and diagnostic procedures in order to formulate a differential diagnosis; on ordering and interpreting diagnostic tests in order to develop a working diagnosis; and on developing and implementing treatment plans including as needed therapeutic procedures, pharmacology, referral and patient education and counseling.

*6 credits*

PHYSICIAN ASSISTANT 533

### **Clinical Medicine III**

The third of a three-semester series, this course is an exploration of obstetric, gynecologic, pediatric diseases and approaches to the surgical and emergency medicine patient. Emphasis is on the integration of anatomy, physiology, pathophysiology, microbiology, history and exam findings and diagnostic procedures in order to formulate a differential diagnosis; on ordering and interpreting diagnostic tests in order to develop a working diagnosis; and on developing and implementing treatment plans including as needed therapeutic procedures, pharmacology, referral and patient education and counseling.

*8 credits*

PHYSICIAN ASSISTANT 534

### **Correlative Medicine I**

The first of a two-course series, this course gives students the skills to develop differential diagnoses and patient-centered management plans, as well as write complete medical notes and give oral presentations. Family medicine and psychosocial medicine are aspects of this course.

*2 credits*

PHYSICIAN ASSISTANT 542

### **Correlative Medicine II**

The second of a two-course series, this case-based course refines the formation of diagnoses and complete management plans of common symptoms. The synthesis of material previously learned in a case-based format refines skills in critical thinking, medical problem solving, the written and the oral presentation of clinical cases

*2 credits*

PHYSICIAN ASSISTANT 551

# Physician Assistant

## History and Physical Exam I

This course has three aims. First, it helps students develop the skills of obtaining a comprehensive and a problem-focused history. Second, students gain the ability to write a medical note. Last, students learn interviewing techniques and the affective aspects of the medical encounter.

*3 credits*

PHYSICIAN ASSISTANT 552

## History and Physical Exam II

The second course in this series focuses on performing a comprehensive physical examination. This course further emphasizes the integration and interpretation of findings to create a foundation for further clinical evaluation. This course further emphasizes normal versus abnormal findings and on accurate and appropriate documentation.

*3 credits*

PHYSICIAN ASSISTANT 556

## Patient Education, Nutrition and Counseling

This course is an evidence-based approach to educate and counsel patients in order to improve lifestyle, increase adherence and reduce medical errors. This course will emphasize disease prevention, health promotion during various stages of life with emphasis on the nutritional aspect of health.

*2 credits*

PHYSICIAN ASSISTANT 565

## Integrative Medicine and Practice

This course exposes students to the philosophy, practice and techniques utilized in alternative and complementary medicine. The focus of this course is on occupational therapy, physical therapy, Tai Chi, Qi Gong, Yoga, Chiropractic techniques and Massage Therapy Ayurveda, Traditional Chinese Medicine, Acupuncture, Naturopathic medicine, Homeopathy, Hypnotherapy. Students have an opportunity to experience some of the modalities, such as Yoga or Massage Therapy, in guided exercise classes.

*2 credits*

PHYSICIAN ASSISTANT 574

## Medical Ethics & Professional Practice

This course presents the student with the four-topic method of evaluation of ethical issues. Student examine ethical issues in terms of medical indications, patient preferences, quality of life and contextual features to provide a response to the ethical dilemma. Additionally, this course incorporates the history, development, certification and licensure process of the

PA profession. PA web sites and professional organizations. Special topics include risk management, professional liability, and, patient safety. Billing, reimbursement, and the organization of healthcare in the US and in other countries are also explored.

*2 credits*

PHYSICIAN ASSISTANT 575

## Global & Preventive Health

This course offers the student the opportunity to investigate the impact of health issues in other countries and the interactive effect on all populations in terms of epidemiology, disease, disasters, economics, health initiatives, ethics and policy.

*2 credits*

PHYSICIAN ASSISTANT 581

## Pharmacology I

This course introduces the student to the basic principles of pharmacology, including mechanisms of action; absorption, distribution, metabolism, and excretion; pharmacokinetics; interactions with other drugs and with food; problems with special populations (prenatal, neonatal, the elderly); rational drug usage for clinical disorders (therapeutics): clinical measures; and toxicology.

*3 credits*

PHYSICIAN ASSISTANT 582

## Pharmacology II

This course builds on Clinical Pharmacology I with more advanced principles of pharmacology, including mechanisms of action; absorption, distribution, metabolism, and excretion; pharmacokinetics; interactions with other drugs and with food. A presentation of drug classes as they relate to the different organ systems includes anticipated results and adverse reaction monitoring.

*3 credits*

PHYSICIAN ASSISTANT 591

## Technical Skills

The demonstration and practice of technical procedures frequently encountered in primary care, emergency medicine, and surgical settings are explored in this course. The emphasis is on such skills as intravenous cannulization, suturing, urethral catheterization, splinting and casting incision and drainage and nasogastric lavage.

*2 credits*

PHYSICIAN ASSISTANT 602

## Information Literacy and Medical Writing

This course develops the ability to identify a clinical problem and to collect, process,

analyze, summarize and present an evidence-based approach solution to that problem. The topic can be a medical challenge in terms of diagnosis or treatment of a disease state, or management issues for patients or their family's issues of which there is lack of consensus or a lack of clear guidelines.

*2 credits*

PHYSICIAN ASSISTANT 651

## Internal Medicine Rotation

This six-week clerkship provides direct patient care experiences in the in-patient setting. Under the direction of board-certified internists, students learn to evaluate and formulate treatment plans for patients with a wide variety of adult illnesses. Emphasis of this clerkship is on critical thinking skills, synthesis of pertinent clinical information, the presentation of problem-oriented patient data, indications for and interpretation of laboratory studies, and competence in clinical procedures.

*5 credits*

PHYSICIAN ASSISTANT 652

## Pediatrics Rotation

This six-week clerkship explores the care of children from birth through adolescence. Acute illness, developmental delay, genetic abnormalities, psychosocial issues and preventive medicine are explored.

*5 credits*

PHYSICIAN ASSISTANT 653

## Surgery Rotation

This six-week clinical experience focuses on the care of the surgical patient in the pre-operative, operating room and post-operative settings. Determination of surgical diagnoses and immediate management of life-threatening conditions are stressed.

*5 credits*

PHYSICIAN ASSISTANT 654

## Emergency Medicine Rotation

This six-week clerkship provides opportunities to evaluate and treat patients with urgent and emergent medical complaints under the supervision of an emergency medical physician. The care of patients with life-threatening illness as well as patients seen in the sub-acute "fast track" are emphasized.

*5 credits*

PHYSICIAN ASSISTANT 655

## Obstetrics/Gynecology Rotation

Experiences in the full range of woman's health issues throughout the reproductive and post-menopausal years are offered in this six-week clerkship, including participation in

## Physician Assistant • Statistic • Technology Management

common gynecological surgical procedures and assisting in labor and delivery. Students learn to provide pre- and post-partum care and family planning as well.

5 credits

PHYSICIAN ASSISTANT 656

### Family Medicine Rotation

Students work with board-certified family physicians and general internists to evaluate, diagnose and treat patients of all ages with a wide variety of illness in this six-week clerkship. Emphasis is on health care delivery in the outpatient setting, health promotion, preventive medicine and the patient-centered medical home.

5 credits

PHYSICIAN ASSISTANT 657

### Psychiatry Rotation

The diagnosis, treatment and management of patients with psychiatric illness in the inpatient, outpatient and emergency settings are stressed in this six-week rotation. This clerkship requires students develop and demonstrate a variety of skills under the supervision and guidance of an experienced psychiatric practitioner.

5 credits

PHYSICIAN ASSISTANT 658

### Elective Rotation

This six-week experience offers the opportunity to explore a discipline of interest in depth. Students are responsible to enhance their understanding of this discipline through by self-motivation.

2 credits

PHYSICIAN ASSISTANT 661

### Capstone Project I

This first part of a two-course series guides students through the selection of a capstone topic, conducting a complete literature search, and devising a plan to collect data. The data collection will continue, with faculty mentorship, through the clinical

4 credits

PHYSICIAN ASSISTANT 662

### Capstone Project II

This course is the second part of the Capstone Project experience. Students will continue the work begun on the projects in semester 6 in MSPA 698 Capstone Project, drawing on skills gained in MSPA 605 Information Literacy and MSPA 647 Research Methods. This course has the added requirement of presenting the project either in poster or presentation form to the

program faculty.

2 credits

PHYSICIAN ASSISTANT 671

### Research Methods

This course provides a foundation in quantitative and qualitative research and evaluation methods appropriate for health professionals. Students will develop competencies in working with communities to identify and understand health related conditions and will be able to evaluate interventions and health outcomes.

2 credits

PHYSICIAN ASSISTANT 695

### Graduate Logistics

This course presents a complete review of clinical medicine in preparation for the summative examination. This course helps students identify content weaknesses. Program resources can best aid students to complete their study and prepare for the NCCPA certifying exam.

1 credit

*\*All students are required to complete all of the seven core supervised clinical clerkships. The clinical clerkship sequence will be individually assigned to students.*

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## Statistics

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STATISTICS 400

### Statistics and Quantitative Analysis

This course is an introduction to basic statistical methodology and its applications to business decisions. Topics include probabilities, discrete and continuous probability distributions, probability sampling techniques, sampling distributions, interval estimation and hypothesis testing. The basics of specific statistical tests will be presented including chi square, correlation, multiple regression and analysis of variance. Students will use software packages to perform statistical analysis. Prerequisite: Admission to graduate study.

3 semester hours

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## Technology Management

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TECHNOLOGY MANAGEMENT 466

### Foundations of DNA and Biotechnology

This course investigates the nature and origin of the human genome and covers contemporary issues. It also covers issues on the management of scientific data from publicly accessible data sources and utilizes cloud computing to easily exploit this information.

It imparts interdisciplinary knowledge on how to understand, organize, manage and analyze biomedical data using contemporary cloud computing processing. Learning goals include understanding scientific context and the limits of technology, design of data, and design of data infrastructure to gain flexibility of data access, use and reuse in different contexts. The design of a biomedical data management system relies on in depth knowledge of highly specific context and the design of various data structures concerning the same data to allow access and exploitation of information related to biomedical applications.

3 lecture hours; 3 semester hours

TECHNOLOGY MANAGEMENT 500

### Graduate Co-Op/Internship in Technology Management

Students will work for a company in a role that is appropriate for an MS - TM graduate, or near graduation. Through this experience students will apply management principles and theory in a practical setting. The student will write a paper summarizing the tasks and accomplishments encountered within the organization, as well as make managerial recommendations for improvement of the company, or division in which s/he was employed. Prerequisite: Final semester of study and the Director, TM Program approval.

1-3 semester hours

TECHNOLOGY MANAGEMENT 505 (TCMG 505/MGMT 555)

### Project Management

This course is an advanced course in Project Management. Topics included are planning and pricing, conflict management, time management, cost management, quality management, project related human resources management, communications management, risk management, procurement management and professional responsibility. This course is based on current and emerging best practices and principles. It will also discuss PM certification requirements and provide real world case studies.

3 lecture hours; 3 semester hours

TECHNOLOGY MANAGEMENT 506 (TCMG 506)

### Advanced Program and Project Management

This is an advanced course in Project Management. Topics included are planning and pricing, conflict management, time management, cost management, quality management, project related human resources management, communications management, risk management, procurement management and professional responsibility. This course is based on current

## Technology Management

and emerging best practices and principles. It will also discuss PM certification requirements and provide real world case studies. Prerequisite: TCMG 505. Can be taken in the same semester with TCMG 505.

*3 semester hours*

### TECHNOLOGY MANAGEMENT 510

#### **Technology Marketing**

This course is a pragmatic course focused on contemporary marketing and innovation issues, opportunities and current and emerging industry best practices in helping technology oriented and engineering organizations grow and achieve sustainable competitive advantages in a complex and rapidly changing global environment. The impact of new technologies, which enable and provide strategic marketing and innovation will also be covered.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 512 (TCMG 512/MGMT 590)

#### **Intellectual Property**

Protection of a business' intellectual property assets can make the difference between success and failure. This course will discuss the strategies and methods available for protection of intellectual property in the global environment. Students will work through the American patent, copyright and trademark processes, including how to prepare and file applications for each. Students completing this course should be able to pass the Patent Agent exam. Global business issues, such as protection of ideas in an off-shoring arrangement, IP co-development and other issues, will also be addressed.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 514

#### **Found Info Security Mgt**

This course is designed to teach students how to engage all functional levels within the enterprise to deliver information system security. The course addresses a range of topics, each of which is vital to securing the modern enterprise. These topics include plans and policies, enterprise roles, security metrics, risk & threat management, standards and regulations, physical security, business continuity, certifications, security technology, applications and careers in information security. Effective information security management at the enterprise level requires planning, broad participation and practice. The ability to secure information in large or small organizations is growing challenge on a global basis.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 515

#### **Cyber Security Forensic Analysis & Inves**

This course introduces students to the fundamental principles and topics of cyber security forensic analysis and investigations. Students learn critical forensic principals, methodology and tools that enable them to plan, develop and perform investigations and analysis. The course addresses hardware, software, wireless devices, processes, communications, applications, policies, procedures and legal implications to help identify incidents and intrusions. Law enforcement, systems and network administrators, attorneys and private investigators and many businesses now rely on the skills of professional cyber security forensic experts to investigate criminal, civil and terrorist activities.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 520 (TCMG 520)

#### **Information Systems Development & Design**

A course in the analysis, design, and development of business systems. Students will learn a variety of development models and tools available for systems development, deployment and management. The role of all systems constituents is addressed through discussion of the specification, decision-making, and review of designs, documentation, program specifications, and system improvement. Course level and content is suitable for managerial as well as the more technically oriented.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 521

#### **Information Systems and Knowledge Management**

The course introduces guiding theories and concepts of knowledge management and its relationship to contemporary workplaces. This course will explore various issues of creating, storing, sharing, and applying knowledge in organizational environments, which will include a review of the role and basic functions of information technology. Successful organizations foster both innovation and efficiency via knowledge. Students will evaluate the different dynamics related to realizing organizational progress through the effective and efficient use of talent, structure, culture, methods, and technology. In addition to the required textbooks, students will be required to research industry journals as a way to evaluate the application of knowledge in real settings across various industries.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 523 (TCMG 523/MGMT 523)

#### **Leadership in Technical Enterprises**

This course focuses on the development of

leadership skills important in the effective management of change. Through role-playing exercises, videotapes, diagnostic tools, seminar discussion, selected readings, and a group project, students will learn theory and build interpersonal skills necessary for providing leadership in diverse multicultural groups and organizations. The course will address the managerial issues present in organizations undergoing accelerating change and adopting a culture of creativity. Creating and sustaining high performance multi-cultural and interdisciplinary traditional and virtual teams is covered.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 524

#### **Statistical Quality Control Techniques**

This course presents Statistical Quality Control techniques used in determining operating quality levels to maintain quality assurance in service and manufacturing industries. Topics covered will include, but not limited to tools for detection and isolation of sources of variation: construction and interpretation of charts for variables and attributes, process control and capability. The course objectives is to develop and operational familiarity with contemporary methods found to be effective.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 525 (TCMG525)

#### **Finance, Accounting and Economics for Engineers**

In today's competitive business world, it is essential for engineers to apply the principles of engineering economics to make rational economic decisions. Students will be exposed to the methods and tools, which are widely used in the financial evaluation and decision-making processes of selecting project alternatives. This course will also provide students with the skills required to read, interpret and apply information about an organization's financial position. Managerial accounting and finance concepts will be presented, followed by financial statement analysis.

*3 lecture hours; 3 semester hours*

### TECHNOLOGY MANAGEMENT 526 (TCMG526)

#### **Decision Analysis in Technology Management**

The purpose of this course is to develop a conceptual framework for assisting in the making and assessment of socio-technological decisions in the management of technology. Heuristics, methodologies, and quantitative models will be introduced to address decision-making. Qualification of subjective judgments and the development of hierarchical decision models are included. The course provides insight into

## Technology Management

making rational decisions where multiple perspectives such as social, technical, economic, environmental, political and legal may impact the decision. Team projects are conducted to apply the concepts.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 530 (TCMG 530/MEEG 530)

### **Foundations of Manufacturing Management**

The objectives of the course are to understand and apply concepts and techniques in manufacturing management. The course includes the management of people (both traditional and high performance systems and teams), lean manufacturing techniques as used on the factory floor, and recent concepts such as Factory Physics. The course focuses on those issues that are important in supervising and managing a modern manufacturing operation.

*3 semester hours*

TECHNOLOGY MANAGEMENT 532 (TCMG 532/MKTG 550)

### **Global Market Management**

Strategy planning, implementation and control for market entry and development. Topics include social, political and economic changes affecting marketing opportunity; focused versus dispersed marketing efforts; marketing in developed and undeveloped countries; and marketing systems required for the various strategic alternatives.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 533 (TCMG 533)

### **Information Technology Strategy and Governance**

This course covers information technology plans, strategy, business/IT alignment, governance, environmental, ethical, economic, regulatory, compliance and technical issues and trends with a focus on planning, organizing, justifying, controlling, implementing and integrating concepts and real world experiences. It discusses business and IT balanced scorecards, metrics and key performance indicators. Current and emerging best business and technology strategy and governance best practice frameworks such as COBIT, CMMI, PMBOK, Kano, VOC, QDF, ITIM, Prince2, ITIL, select ISO standards and others will be covered with emphasis on lessons learned, critical success factors and pragmatic solutions. Individual and team projects and case studies are integrated into the course.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 534 (TCMG 534/MGMT 535)

### **Strategic Sourcing and Vendor Management**

This course covers the rewards and risks of outsourcing and vendor management and identifies where outsourcing should be used

and not used. The objectives of the course are to help students understand how to plan, direct, manage and more effectively participate in outsourcing initiatives in terms of the feasibility of outsourcing (off-shore, near-shore, rural-shore, best shore), vendor selection, contract negotiation, vendor management and evaluation, risk assessment and terminating outsourcing deals. Prerequisite: TCMG 523 and TCMG 505 or Director, TM program approval.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 535 (TCMG 535/BMEG 535)

### **Foundations of Bio Tech Sciences and Management**

This course covers the comprehensive scope of knowledge of major issues and technologies in the bio technology field. This includes regulatory, robotic, imaging, cybernetics, bio-informatics, genetics, ethics and related areas. Individual and team projects will be assigned.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 537

### **Technical Communication for Engineers**

This course is designed to improve oral and written methods of communication related to technology, engineering, and science. Common forms of professional technical communication (e.g. emails, memoranda, white papers, standard operating procedures, customer presentations, and technical brochures) as well as more advanced technical communication (e.g. posters, patents, research articles, academic presentations, books, dissertations, engineering drawings, Bills of Materials, technical standards, and engineering specifications) are emphasized. Course topics will review vocabulary, grammar, writing, reading comprehension, speaking and presentation skills to help students succeed in graduate level studies while also gaining necessary job-related skills.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 538

### **Manufacturing and Serv Eng**

The course covers service industry principles, manufacturing systems, facility layout, Factory Physics, Theory of Constraints, aspects of lean manufacturing, manufacturing for sustainability, and manufacturing safety as well as the management of people in service and manufacturing environments.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 540

### **Simulation and Modeling**

The purpose of this course is to provide an in depth coverage of the use of simulation and modeling as an analysis tool for the study of

production and distribution processes. The course aims to develop a sense of critical thinking, learning and problem solving. Topics include: problem formulation, data collection and analysis, random variable generation, and statistical analysis of output. Utilizes a major simulation language, SIMAN.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 546 (TCMG 540/MEEG 540)

### **Engineering Economics**

The course covers the concepts and methods that will assist engineering and technology managers and professionals to make alternative investment and funding decisions regarding projects, programs, products, business expansion and other alternatives using the financial calculations involving time value of money (IRR, ROI, NPV), uncertainty and risk. Topics include engineering and related financial evaluation techniques and formulas, choosing among alternatives, sensitivity analysis, economic analysis, opportunity costs, depreciation, amortization, probability, cost estimating and systems and others.

*3 semester hours*

TECHNOLOGY MANAGEMENT 549

### **Bus Intelligence & Decision Support Syst**

*3 semester hours*

TECHNOLOGY MANAGEMENT 555

### **Contemp Prob Tech Mgmt**

*3 semester hours*

TECHNOLOGY MANAGEMENT 558 (TCMG 558)

### **Biotechnology & Entrepreneurship**

This course covers theory and practice of bio-entrepreneurship. It explores the transformative and disruptive nature of scientific discoveries and the innovative and entrepreneurial process for turning knowledge into profitable business. Students are required to develop and communicate in-depth knowledge on the evolution of the biotechnology industry and the behavior of entrepreneurial biotechnology firms to build core competencies and acquire funding. Individual and team projects and case studies are integrated into the course.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 559 (TCMG 559)

### **Found of Bus Process & Ops Mgt**

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 560 (TCMG 560)

### **Foundations of Environmental and Energy Management**

This course covers the assessment of current and potential environmental and energy management issues, opportunities and threats.

# Technology Management

Key issues such as global warming, pollution, global energy supply and demand needs will be discussed. Alternative energy sources are reviewed, including examination of energy technologies in each fuel cycle stage for fossil (oil, gas, synthetic), solar, biomass, wind, hydro, nuclear, and geothermal energy types, along with storage, transmission, and conservation issues.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 561 (TCMG 561)

## **Economic, Regulatory, Cultural, and Societal Issues in Environment and Energy Management**

The course will focus on a review of the environmental and energy management safety, hazard identification and disaster prevention policies, laws, concepts and issues. U.S. and international laws, regulations and standards will also be covered. The course will provide the student with a better understanding of how the complexity of this topic impacts economic, political, cultural and societal and opportunities in environment and energy management.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 568

## **Intro to SQL and R for Data Science**

This course teaches Structured Query Language (SQL) and R programming languages. SQL is used by database administrators, data analysts, business intelligence specialists for setting up and running analytical queries. R Programming language is used for data analysis and visualization. The is designed to provide a comprehensive overview and step-by-step instructions on SQL. In this course, students will learn how to create and design tables, manipulate data and run reports, and create programs such as stored procedures, functions and triggers. More advanced concepts such as cursors will also be covered. Oracle database techniques applicable to other popular SQL engines including Microsoft SQL Server and MySQL.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 571 (TCMG 571/MGMT 571)

## **Foundations of Service Management and Engineering**

With the rapid growth of the services industry, this course integrates topics from economics, engineering, law, technology and organizational theory to deal with how firms change over time to become more service oriented or become service business and the mechanisms and tools by which they seek innovation and competitive advantage in the service sector. The services life cycle is reviewed. In addition,

enabling technologies and how different disciplines help to answer questions about how business services combine, evolve, standardize and mature are covered.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 572 (TCMG 572/MEEG 572)

## **Production Technology and Techniques**

This course will introduce up-to-date technology, techniques and systems of the global manufacturing industry. American manufacturing situation would be analyzed and Japanese manufacturing success is also explored. Comprehensive and readable description of manufacturing practice is researched.

*3 semester hours*

TECHNOLOGY MANAGEMENT 573 (TCMG 573/MEEG 573)

## **Supply Chain Management**

The goal of this course is to cover not only high-level supply chain strategy and concepts, but also to give students a solid understanding of the analytical tools, to understand supply chain design, planning and operation and high it impacts the performance of a firm. It also conveys how supply chain drivers used on a conceptual level during supply chain design and operation lead to performance improvements.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 574 (TCMG 574/MEEG 574)

## **Principles of Logistics and Materials Management**

This course presents materials management, logistics theory and concepts in today's manufacturing and commercial environments. It integrates all of the functional areas of the business as well as incorporating logistics into corporate operation. They are examined in light of how they interrelate with other functions for the firms.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 575

## **Introduction to Big Data & Data Science for Technology Management**

This course introduces the concepts of big data, data science, and data analysis. These concepts are applied to applications and services. Because large amounts of data can best be understood in graphic or pictorial format, data visualization is also introduced. Since data science inherently involves statistical analysis a few basic constructs such as cluster and regression analyses will be part of this course. These statistical concepts will be strengthened with exercises using R. R is an open source programming language and software environment for statistical computing and graphics analysis.

An R package, Shiny, is applied for interactive web applications. Python is also introduced for comparison with R. Case studies will focus on information and communications technologies for sustainable development.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 577

## **Lean Manufacturing**

This course teaches the core methods and philosophy of lean manufacturing. Lean Manufacturing is historically based on the Topoto Production System used to significantly reduce the time, increase the reliability and reduce the cost, space requirements and inventory of a manufacturing environment. Each week a different aspect of the Lean Manufacturing will be taught. Each week, homework will focus on the implementation of these concepts into the term project designs.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 578

## **Six Sigma**

Six Sigma is a methodology and set of quality management tools (especially statistical methods) used to improve the quality of process outputs, identifying and removing the causes of defects or errors and minimizing variability in manufacturing and business processes. This course teaches the core methods and philosophy of Six Sigma. Each week a different aspect of the Six Sigma will be taught. Each week, homework will focus on the implementation of these concepts into term project designs.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 580

## **New Product Commercialization**

The objectives of the course are to understand and apply concepts and techniques of product commercialization. The course focuses on taking student created product concepts and having student teams drive the concepts to become actual products. Product design, prototype creation, market analysis, and financial analysis all come together within the student team to create a viable product. If ideas are worthy, teams may work with the University's CTech IncUBator to actually commercialize their products. Students are strongly encouraged to find a sponsor to actually commercialize their product ideas.

*3 lecture hours; 3 semester hours*

TECHNOLOGY MANAGEMENT 595

## **Technology Business Strategy (Capstone Course)**

This course provides an opportunity for students to apply the knowledge and skills they have learned throughout their TM course of studies with their business and technology

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experiences from a multi-disciplinary perspective. The Strategic management process represents the full set of organizational policies, plans, practices, commitments, decisions, governance mechanisms and actions required for a firm to develop a vision and a compelling business plan and execute the plan to achieve strategic competitiveness, earn above-average returns and sustain growth. The course will develop and integrate knowledge of the strategic management process, frameworks and tools, including strategy development, formulation and deployment, while embracing and managing rapid and constant change and minimizing business disruption

*3-6 semester hours*

TECHNOLOGY MANAGEMENT 597

### **Master's Project**

A capstone course dealing with the development and implementation of business strategy and plan within a framework of ethical decision-making, globalization and managing accelerating change. It tests the capability of the student to apply and integrate all prior graduate learning to solve actual strategic management problems, develop a business plan and conduct organizational performance and governance assessments. The final project of this course is project-based and shall constitute, therefore, an outcome assessment of what the student has learned in the MS - TM program. Prerequisite: TCMG 505, 525 and 524; minimum grade C.

*3-6 semester hours*

TECHNOLOGY MANAGEMENT 597 C

### **Masters Project (Completion)**

Topics to be arranged. Prerequisite: Approval of the Director, TM Program.

*1 semester hour*

TECHNOLOGY MANAGEMENT 598

### **Thesis in Technology Management**

Completion of a report based on field, library and institutional research to demonstrate ability to conduct investigations in a technology management discipline. Approval of the Director, TM Program.

*3-6 semester hours*

TECHNOLOGY MANAGEMENT 599

### **Independent Study in Technology Management**

This course is reserved for a special project that cannot be done any other way and to help a student complete the MS when no other alternative is available. Prerequisite: Approval of the Director, TM Program.

*3 semester hours*

TECHNOLOGY MANAGEMENT 620

### **Strategic Management of Technology and Innovation**

This course presents a coherent process for the formulation, implementation, and assessment of technology strategy. This includes the technology life cycle of initiation, growth, maturation, and decline of business innovation. Technology management and innovation are studied within a strategic management perspective. Methods of technology planning, aligning technology with business strategy for competitive advantage, and strategic management for use in organizations that use a broad range of technologies are discussed. Strategies for commercializing products and services, new technology adoption, process innovation and business/technology transformation are included.

*3 semester hours*

TECHNOLOGY MANAGEMENT 645

### **Technology New Venture Creation**

This course is for graduate students interested in starting a technology venture, joining a small firm intent upon rapid growth, or pursuing a career in consulting, venture capital, or the management of a technology business or venture for larger companies. The course will provide an opportunity to identify and analyze new business and technology venture issues and opportunities. Select topics covered include: evaluating market opportunities, designing profitable business models, producing a solid business plan, raising capital (multiple rounds), protecting intellectual property and exit strategies such as a merger, the sale of the company or an initial public offerings (IPO).

*3 semester hours*

TECHNOLOGY MANAGEMENT 694

### **Written/Oral Comprehensive Exam**

Students taking comprehensive Ph.D. examinations are required to register for (TMPD)\* 694.

*0 semester hours*

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## **Technology Management (Ph.D.) Doctoral Seminars**

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These courses are designed for doctoral students only. (TMPD= Technology Management Ph.D. course)

TECHNOLOGY MANAGEMENT 694

### **Written/Oral Comprehensive Examination**

Students taking comprehensive Ph.D. examinations are required to register for (TMPD)\* 694.

*0 semester hours*

TECHNOLOGY MANAGEMENT 698

### **Teaching Requirement**

Ph.D. students assigned to teach courses to fulfill the teaching practicum of the Ph.D. in Technology Management are required to register for (TMPD) 698.

*0 semester hours*

TECHNOLOGY MANAGEMENT 699

### **Seminar (Oral Defense of Dissertation Proposal (Oral Defense))**

This course is a zero credit course. It involves attending the regular departmental seminars and presenting one's work in one of the seminars.

*0 semester hours*

TECHNOLOGY MANAGEMENT 702

### **Explorations in Research Methodologies**

This course exposes students to a wide variety of research approaches across many disciplines. Explores the processes and problems of designing and conducting various kinds of research. Develops skill in evaluating TM research. Through a series of guest researchers, enables students to discuss research process and publication issues with experts. Explores the non-statistical issues in research planning and execution. Develops understanding and skill in the scientific approach, problem definition, hypothesis development, research design and methodology planning.

*3 semester hours*

TECHNOLOGY MANAGEMENT 704

### **Research, Design, Data Analysis and Measurement**

The major objective of this course is to provide beginning doctoral students with an understanding of the central issues and choices in research design. The course is designed to prepare students to design and conduct research studies. Emphasis will be placed on how to think about research problems, what are appropriate methods to approach such problems, and what are the related issues in the choice of research methodology. Students will be introduced a broad array of data collection methods that are used in social science research. Prerequisite: TMPD 702

*3 semester hours*

TECHNOLOGY MANAGEMENT 706

### **Quantitative Methodologies**

This course provides the mathematical and statistical preparation to support subsequent doctoral course work within the Technology Management department and prepare

## Technology Management Doctoral Seminars

the student to apply quantitative methods and data analysis techniques. Topics include probability, statistics, measurement and evaluation, sampling, designing studies, linear algebra, linear programming, optimization, simulation, and modeling and regression analysis. Students make extensive use of leading-edge industry software packages.

*3 semester hours*

TECHNOLOGY MANAGEMENT 710

### **Ph.D. Dissertation**

This course is the Ph.D. Dissertation. The student is expected to work on the accepted topic and come up with original results. S/he has to report the results in the form of a Ph.D. dissertation. The student is encouraged to document the intermediate results in the form of reports. S/he is also encouraged to publish these results as they are discovered, in the international professional literature, i.e., refereed conference proceedings and journals. Proof of good work is the acceptance of the results by reputable journals. Intermediate results can also be discussed in departmental seminars. The completed dissertation must be distributed to the dissertation committee members at least two weeks before the dissertation defense. The committee will read it and certify that the dissertation is a work of substantial merit and that it can be defended. It is the responsibility of the student that the final draft of the dissertation addresses all legitimate concerns of the committee members.

*Minimum of 15 semester hours*

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### **Area 1: New Technology Venture Creation Electives**

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It is assumed that individuals taking this focus area will have the appropriate academic and business/industrial background. Those people not having the needed background will be responsible for taking necessary prerequisite courses, which will not count toward the minimum classroom hours required for the Ph.D. degree.

TECHNOLOGY MANAGEMENT 505 (TCMG 505/MGMT 555)

### **Global Program and Project Management**

This course focuses on the managerial aspects of how to more effectively manage, plan and execute programs/projects with a focus on high quality deliverables arriving on time, within budget, within scope and to the customer's satisfaction. Areas covered will include program and project management life cycle phases, executive sponsorship, portfolio

investment management selection and prioritization, requirements, scope and project charters, planning, development, estimating, staffing, leadership, scheduling, risk management, change management, project metrics, vendor integration and management and other related topics. This course is based on current and emerging best practices and principles. It will also discuss PM certification requirements and provide real world case studies.

*3 semester hours*

TECHNOLOGY MANAGEMENT 506 (TCMG 506)

### **Advanced Program and Project Management**

This is an advanced course in Global Program and Project Management. It covers the Project Management Institute's Knowledge and Process areas and prepares students to take various PMI Project Management Certification. Prerequisite: TCMG 505

*3 semester hours*

TECHNOLOGY MANAGEMENT 508 (TCMG 508 / MGMT 565)

### **Foundations of Product Management**

This course covers new product development and innovation, as well as the product management life cycle. Topics covered include the feasibility and investment prioritization of new products or product enhancements, raising capital for new product development, market and customer needs analysis, make versus buy alternatives and product launch and commercialization issues and considerations, including promotion, pricing, distribution, competition, pre and post sales support, systems and infrastructure support, customer service and related areas. Students will work on individual and team projects that will include the development of a new product market/business plan.

*3 semester hours*

TECHNOLOGY MANAGEMENT 512 (TCMG 512 / MGMT 590)

### **Advanced Intellectual Property Management**

This course will discuss the strategies and methods available for protection of intellectual property in the global environment. Students will work through the American patent, copyright and trademark processes, including how to prepare and file applications for each. Students completing this course should be able to pass the Patent Agent exam. Global business issues, such as protection of ideas in an offshoring arrangement, IP co-development and other issues, will also be addressed. Students will understand that the protection of a business' intellectual property assets can make the difference between success and failure.

*3 semester hours*

TECHNOLOGY MANAGEMENT 523 (TCMG 523/MGMT 523)

### **Leadership, Teams & Managing Change**

This course focuses on the development of leadership skills important in the effective management of change. Through role-playing exercises, videotapes, diagnostic tools, seminar discussion, selected readings, and a group project, students will learn theory and build interpersonal skills necessary for providing leadership in diverse multicultural groups and organizations. The course will address the managerial issues present in organizations undergoing accelerating change and adopting a culture of creativity. Creating and sustaining high performance multi-cultural and interdisciplinary traditional and virtual teams is covered.

*3 semester hours*

TECHNOLOGY MANAGEMENT 525 (TCMG 525)

### **Finance and Accounting for Managers**

This course provides managers with the skills required to read, interpret and apply information about an organization's financial position. Managerial accounting and finance concepts will be presented, followed by financial statement analysis. Topics presented from a managerial perspective will include how accounting data is generated during business operations, how financial statements are created and analyzed, and management of finance to maximize return on investment and stakeholder equity and other related topics. Students will be required to participate in case work applying the principles presented in the class.

*3 semester hours*

TECHNOLOGY MANAGEMENT 532 (TCMG 532/MKTG 560)

### **Global Market Management**

Strategy planning, implementation and control for market entry and development. Topics include social, political and economic changes affecting marketing opportunity; focused versus dispersed marketing efforts; marketing in developed and undeveloped countries; and marketing systems required for the various strategic alternatives.

*3 semester hours*

TECHNOLOGY MANAGEMENT 559 (TCMG 559/MGMT 560)

### **Foundations of Business Process and Operations Management**

The nature of any organization is to provide products and services. At the heart of such provision is the operations management function, which can account for 60% to 75% of an organization's operating costs, investment and assets. Consequently the operations management role is challenging and dynamic, ranging from short-term control to long-term planning activities. Indeed due to the critical nature of the operations management function it is highly visible and exposed to scrutiny, more

## Technology Management Doctoral Seminars

so than any other function of an organization. Therefore, if you want a career which is demanding and stimulating, as well as knowing that you are contributing to the success of an organization, the Operations & Business Management course can provide you with the perfect launch pad.

*3 semester hours*

TECHNOLOGY MANAGEMENT 582 (TCMG/MGMT 582)

### **Small Business and Entrepreneurship**

This course provides a comprehensive review of the marketing, operational, financial, product, service and business strategy and plans that must be mastered and developed as foundation for start-up of a small business or entrepreneurship enterprise. In addition, the growth of existing business, through Intrapreneurship, is also covered. Students are required to develop a comprehensive business plan for a business of their own choice and which is acceptable to the instructor.

*3 semester hours*

TECHNOLOGY MANAGEMENT 580 (TCMG 580X/MGMT 585X)

### **New Product Commercialization**

The objectives of the course are to understand and apply concepts and techniques of product commercialization. The course focuses on taking student created product concepts and having student teams drive the concepts to become actual products. Product design, prototype creation, market analysis, and financial analysis all come together within the student team to create a viable product.

*3 semester hours*

TECHNOLOGY MANAGEMENT 595 (TCMG 595)

### **Technology Business Strategy (Capstone/Course)**

This course is a capstone course dealing with the development and implementation of a business strategy and plan within a framework of ethical decision-making, globalization and managing accelerating change. It tests the capability of the student to apply all prior learning to solve actual strategic management problems.

*3 semester hours*

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## **Area 2: Select Current Emerging Technologies (Technology Specializations)**

### **Bio-Technology and Bio-Medical Technology, Systems and Processes**

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It is assumed that individuals taking this fo-

cus area will have the appropriate academic and business/industrial background. Those people not having the needed background will be responsible for taking necessary prerequisite courses, which will not count toward the minimum classroom hours required for the Ph.D. degree. Students are expected to have a working knowledge of statistics, biology and chemistry.

BIOMEDICAL ENGINEERING 508 (BMEG 508/MEEG 508)

### **Biomechanics**

Biomechanics is the application of mechanical principles to living organisms that included bioengineering, research and analysis of mechanism in living organisms, and application of engineering principles to and from biological systems. This course can be carried forth from the molecular level including collagen and elastin, all the way up to the tissue and organ levels. Some simple applications of Newtonian mechanics can supply approximations on each level, but precise details demand the use of continuum mechanics.

*3 semester hours*

BIOMEDICAL ENGINEERING 510 (BMEG 510/ELEG 510)

### **Medical Machines**

This course provides a very good introduction and understanding of Electrical Safety, Medical electronics and Medical Machines, as applicable. Students often have different backgrounds and levels of understanding of technical concepts; therefore, we will develop the necessary background in this course in first few weeks and gradually move from basic to advance topics as listed below in "Class Topics" section. This course will further help by developing an approach to design devices and safety features. Behind every invention, law or device, there is always a need, a necessity. Students go from necessity to invention in the class since a large number of electronic equipment are being used in hospitals and medical centers for patient care and diagnosis or to carry out advanced surgeries. This course will enable students to learn the basics principles of different instruments used in medical science.

*3 semester hours*

BIOMEDICAL ENGINEERING 513 (BMEG 513/ELEG 513)

### **Biomedical Image Processing**

This course is an elective course. The content of this course include the fundamentals of Digital Image Processing and its applications in biomedical field. Sampling and Quantization of signals are mentioned in order to introduce the digital images, some basic relationship

between pixels are mentioned. Introduction to Fourier Transformation, Discrete Fourier Transform and Fast Fourier Transformed are explained. MATLAB programming with Image Processing Toolbox will be introduced to empathize and rigid the understanding of students. Others important fundamental theorems, e.g., Image Enhancement, Image Segmentation, Representation and Description are also mentioned. Students are required to implement some programs using the theorems learnt in classes.

*3 semester credits*

TECHNOLOGY MANAGEMENT 535 (TCMG 535/BMEG 535)

### **Foundations of Bio Tech Sciences and Management**

This course covers the comprehensive scope of knowledge of major issues and technologies in the bio technology field. This includes regulatory, robotic, imaging, cybernetics, bioinformatics, genetics, ethics and related areas. Individual and team projects will be assigned.

*3 semester hours*

BIOMEDICAL ENGINEERING 547 (BMEG 547/ELEG 547)

### **BioMEMS**

This course will introduce to students the fundamentals of BioMEMS, the application of MEMS (Microelectromechanical Systems) for biological applications. The topics include microfabrication, microfluids, biosensors, actuators, micro/nano drug delivery systems, micro total analysis systems and lab-on-a-chip devices, and detection and measurement systems. The main focus is to understand the fundamental challenges and limitations involved in designing and fabricating various BioMEMS and BioNEMS devices

*3 semester credits*

TECHNOLOGY MANAGEMENT 555X (TCMG 555/BMEG 555X)

### **Biotechnology and Entrepreneurship**

The course examines the principles of bio-entrepreneurship in developing new products, services and processes. Students will learn about the biotechnology dynamics at the global scale in the biomedical drug, diagnostic, hospital management, and devices industries and their markets. Deliverables include homework, assignments, an academic report and a team project. This course provides students with the skills required to read, interpret and apply academic literature, how to identify, extract and understand important information that is useful in the bioentrepreneurial decision making processes. Students will be required to participate in case work applying the principles presented in the class. 3 Semester hours

## Technology Management Doctoral Seminars

3 semester hours

BIOMEDICAL ENGINEERING 562 (BMEG 562/ELEG 562)

### Nanofabrication with Soft Materials

This is an advanced level graduate course focusing on fabrication of soft materials. Nanofabrication processes and nanosystem products will be discussed. Fundamentals associated with chips fabrications and linking them toward soft materials assembly will be detailed. Emerging nanotechnology based methods for soft and green electronics, mechanical parts, MEMS, PCBS will be covered. Gene chip, label free sensory assay using micro and nanofluidics will be discussed. Transfer printing, DNA-protein interactions using the chip and several nano-scale assemblies for soft materials fabrication will be discussed.

3 semester credits

BIOMEDICAL ENGINEERING 563 (BMEG/MEEG 563)

### Polymer Nanocomposites

A great deal of emphasis is put on you getting exposure to the growing field of nanocomposite materials and their biomedical engineering applications. This exciting field is constantly evolving. New composite materials are always being developed and their commercial impact is beginning to be seen. Hence many biomedically relevant nanocomposites such as biogels, bones, cartilages etc and their bioinspired analogs will be covered. The processes pertaining to in-situ and ex-situ nanocomposites, many antibacterial nanoparticle syntheses and their use in device will be covered in detail. Students will learn the structure and properties of polymers. Polymer-carbon nanotube, polymer-graphene and polymer-nanoparticle based nanocomposites will be discussed. Design and development of mechanical, thermal, electronic and multifunctional nanocomposites are their direct and indirect interfaces with natural and synthetic biological structures will be discussed.

3 semester hours

BIOMEDICAL ENGINEERING 565 (BMEG 565/ELEG 565)

### Biomedical Materials and Engineering

This course introduces the student to the progress of biomaterials used in biomedical engineering. Starting from early civilization biomaterials, this course discusses modern advanced level biomaterials and their engineering principles associated with their biomedical use. Hip, knee prostheses, implants, grafts, sutures, stents, catheter materials, and their application in Biomedical Engineering are covered. Designed biomaterials such as silicones, polyurethane, Teflon, hydrogels, bionanocomposites are detailed. Modern biology and bio-

medical engineering such as protein absorption, biospecific medical materials, nonfouling materials, healing and foreign body reaction, controlled release, etc., are discussed. Surface-immobilized biomolecules in patterned surfaces are explained with specific examples for the use of immobilized biomolecules, immobilized cell ligands, and immobilization methods. Recent advances in biomedical engineering from the perspectives of inkjet printing of cells and tissues for 3D medical textiles, nanofibers and films in biomedical engineering by electrostatic spinning, bio-inspired materials through layer by layer (LBL) assembly and biogels and advanced instrumentations in biomedical engineering are updated. Artificial red blood and skin substitutes, orthopedic biomaterials applications adhesives and sealants, diagnostics, biomedical sensors, extracorporeal artificial organs and ethical issues of biomedical engineering are discussed.

3 semester hours

BIOMEDICAL ENGINEERING 567 (BMEG/MEEG 567X)

### Physiological Fluid Dynamics

There is a great and vital difference between the transport processes in the human body from other engineering systems. A thorough understanding of physiological fluid mechanics is essential for innovation in medical assist and monitoring devices. Emphasis in this course is placed on assist devices, flow and thermal measurements, modeling for engineering application, and understanding application to biomedical problems.

3 semester hours

BIOMEDICAL ENGINEERING 580 (BMEG 580)

### Tissue Engineering

The objective of this course is to provide students a foundation for the understanding of cell based systems needed for tissue engineering. The structure-property-function relationships in normal and pathological mammalian tissues will be covered. A review of the current development of biological substitutes to restore, maintain, or improve functions that includes strategies to regenerate metabolic organs and repair structural tissues, as well as cell-based therapies to deliver proteins and other therapeutic drugs will be discussed. There are a variety of very important materials issues in tissue engineering, which will be discussed in detail. Cells adherence to the extracellular matrix materials in the body and their enormous effect on cell behavior will be detailed. The physical and chemical properties of these materials will be examined and important materials used in tissue engineering

will be discussed

3 semester hours

COMPUTER SCIENCE 551 (CPSC 551)

### Advanced Database Design

This course introduces database design with an emphasis on systems (as opposed to applications). Topics include relational model, SQL, database normalization techniques, data storage and indexing, query evaluation and optimization, physical database design, and transaction management.

3 semester hours

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## Information Analytics, Technology and Decision Support Systems

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It is assumed that individuals taking this focus area will have the appropriate academic and business/industrial/STEM background. Those people not having the needed background will be responsible for taking necessary prerequisite courses, which will not count toward the minimum classroom hours required for the Ph.D. degree. Students are expected to have a working knowledge of statistics and a combination of information technology and computer science courses.

COMPUTER SCIENCE 546 (CPSC 546)

### Services Oriented Architecture

This course covers Service-Oriented Architectures as well as associated technologies such as XML processing, Web Services and Ajax. SOA is an approach to building a set of web services such that larger applications are exposed as smaller service modules (web services) that also allow integration via service composition mechanisms to build newer, useful larger applications. SOA is an evolution of distributed object computing and utilizes the messaging design pattern between web services. An application's business logic (middleware), or data related functions are modularized and presented as services for consumer/client applications. These services in a proper SOA design are loosely coupled in nature; i.e., the service interface is independent of the implementation. Application developers can build newer applications by composing one or more services without knowing the services' underlying implementations. This course not only presents the concepts behind proper SOAs, but also covers the technologies such as WCF (based on latest WS-\* specifications) needed to practically build such architectures.

3 semester hours

COMPUTER SCIENCE 551 (CPSC 551)

## Technology Management Doctoral Seminars

### Advanced Database Design

This course introduces database design with an emphasis on systems (as opposed to applications). Topics include relational model, SQL, database normalization techniques, data storage and indexing, query evaluation and optimization, physical database design, and transaction management.

*3 semester hours*

COMPUTER SCIENCE 555 (CPSC 555)

### Web-based Application Development

This course provides an introduction to fundamental issues in designing a web-based application. Review of the web technologies such as HTML, VBScript, DHTML, Java, XML and server-side technologies using Active Server Pages (ASP), CGI and Java Server Pages (JSP). Design issues include the creation of tiered and scalable applications by the use of COM+ components involving Microsoft Transaction Server and the Java Beans. Different projects are assigned to create dynamic, database-driven E-Commerce solutions involving, order tracking systems, inventory systems, inventory management, advertising management, creating score reports, personalizing the shopping experience and secure credit card transactions. Wireless E-Commerce applications and developing business-to-business applications using XML, SOAP and Biztalk Servers.

*3 semester hours*

COMPUTER SCIENCE 556 (CPSC 556)

### Data Mining

This course is dealing with basic concepts, tasks, methods, and techniques in data mining. The focus is on various data mining problems and their solutions, such as association rule, classification, and clustering analysis. Students will learn various techniques for data mining, and apply the techniques to solve data mining problems. The following topics will be discussed in this course Introduction of Data Mining, Mining Frequent Patterns, Associations, and Correlations, Classification and Prediction, Cluster Analysis, Mining Stream, Time-Series, and Sequence Data, Graph Mining, Mining Spatial, Multimedia, Text and Web Data and Applications and Trends in Data Mining.

*3 semester hours*

COMPUTER SCIENCE 562 (CPSC / CPEG 562)

### Information Assurance

This course covers both the principles and practice of information assurance. The topics include law and ethics of information security, intrusion detection, firewall & trusted computing, trust management, authentication & biometrics, authorization and access control, web

security, web service security, privacy issues, principles & practices of IT auditing, information systems security professional certification (CISSP). The basic issues to be addressed by information assurance are explored through a tutorial and survey of law and ethics at the very beginning of the course. Then, the detailed practice of information assurance is explored via practical aspects as well as applications that have been used and implemented nowadays.

*3 semester hours*

COMPUTER SCIENCE 571 (CPSC / CPEG 571)

### Internet Computing

This course discusses the principles and practices of computing problems over the Internet. This course focuses on the Internet as a domain for sharing information and resources with cloud systems. The topics include distributed systems, World Wide Web, the browser-cloud computing model, cloud systems, information retrieval and search technologies, multi-agent systems, web usage mining and personalization, social networks, peer-to-peer technologies, and semantic webs. Foundations of Internet computing and how to use modern technological frameworks to develop various Internet-based applications are covered by this course. Application areas include finance and e-business, government services, scientific computing, bioinformatics, collaborative computing, multimedia applications, and file-sharing systems. This course is not intended to be a course on web site development.

*3 semester hours*

TECHNOLOGY MANAGEMENT 520 (TCMG 520)

### Information Systems Development and Design.

This course focuses on the analysis, design, and development of business systems. Students will learn a variety of development models and tools available for systems development, deployment and management. The role of all systems constituents is addressed through discussion of the specification, decision-making, and review of designs, documentation, program specifications, and system improvement. Course level and content is suitable for managerial as well as the more technically oriented.

*3 semester hours*

TECHNOLOGY MANAGEMENT 521 (TCMG 521/ ITKM 505)

### Information Systems and Knowledge Management

The purpose of this course is to acquaint the students with some of the organizational and management issues surrounding the emergence of information and knowledge as key factors in developing and maintaining a competitive advantage for firms. The course is organized around two ideas, 1) knowledge

as a manageable asset, and 2) why people in organizations sometimes don't use what they know. A basic assumption of the class is that organizations are complex adaptive systems operating in highly competitive, information and knowledge rich environments.

*3 semester credits*

TECHNOLOGY MANAGEMENT 533 (TCMG 533)

### Information Technology Strategy and Governance

This course covers information technology plans, strategy, business/IT alignment, governance, environmental, ethical, economic, regulatory, compliance and technical issues and trends with a focus on planning, organizing, justifying, controlling, implementing and integrating concepts and real world experiences. It discusses business and IT balanced scorecards, metrics and key performance indicators. Current and emerging best business and technology strategy and governance best practice frameworks such as COBIT, CMMI, PMBOK, Kano, ITIM, Prince2, ITIL, select ISO standards and others will be covered with emphasis on lessons learned, critical success factors and pragmatic solutions. Individual and team projects and case studies are integrated into the course.

*3 semester hours*

TECHNOLOGY MANAGEMENT 540 (TCMG / MEEG 540)

### Simulation and Modeling

The purpose of this course is to provide an in depth coverage of the use of simulation and modeling as an analysis tool for the study of production and distribution processes. The course aims to develop a sense of critical thinking, learning and problem solving. Topics include: problem formulation, data collection and analysis, random variable generation, and statistical analysis of output. Utilizes a major simulation language, SIMAN.

*3 semester hours*

TECHNOLOGY MANAGEMENT 549 (TCMG 549/ MGMT 548)

### Business Intelligence and Decision Support Systems

Decision Support Systems (DSS) are interactive computer based systems that help decision makers understand and use data, models, and other analytical tools to evaluate their options. The course will focus on several aspects of DSS. Topics covered include Data-Driven systems, Model-Driven systems and Communications-Driven systems that help groups solve problems and Knowledge-Driven systems, and Document-Driven systems (expert systems). This course will enhance the student's ability to understand the design and development of DSS with Web technology. Prerequisites:

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Completion of all required Information Technology and Knowledge Management required concentration courses or concurrent registration in final required concentration courses.

*3 semester credits*

TECHNOLOGY MANAGEMENT 568 (TCMG 568/ CPSC 568)

### **Foundation of Information Analytics**

This course will introduce the foundation of Informatics. It will review how information sciences and computer technology can be applied to enhance research and practice in management and technology. The basic principles of informatics that govern communication systems, information retrieval, data mining, data warehousing support and evidence based business and technology decision support will be explored. Various Informatics tools will be covered.

*3 semester hours*

TECHNOLOGY MANAGEMENT 571 (TCMG 571/MGMT 571)

### **Foundations of Service Management and Engineering**

This course integrates topics from economics, engineering, law, technology and organizational theory to deal with how firms change over time to become more service oriented or become service business and the mechanisms and tools by which they seek innovation and competitive advantage in the service sector. The services life cycle is reviewed. In addition, enabling technologies and how different disciplines help to answer questions about how business services combine, evolve, standardize and mature are covered.

*3 semester hours*

### ***Manufacturing, Supply Chain and Logistics, Technology, Systems and Processes (Electives)***

It is assumed that individuals taking this focus area will have the appropriate academic and business/industrial/application background. Those people not having the needed background will be responsible for taking necessary prerequisite courses, which will not count toward the minimum classroom hours required for the Ph.D. degree. Math skills that include calculus are required, and students are expected to have a working knowledge of statistics.

MECHANICAL ENGINEERING 512X (MEEG 512X)

### **Computational Fluid Dynamics**

This course is intended as an introduction to

the field of Computational Fluid Dynamics (CFD). Finite difference/finite volume methods will be introduced for solving Navier-Stokes and energy equations in heat transfer and fluid dynamics processes. This course will help students develop practical skills in Computational Fluid Dynamics and the use of commercial CFD packages, such as STAR-CCM+. Students will apply these skills to relevant engineering applications and gain an appreciation of the limitations and advantages of CFD modeling.

*3 semester hours*

TECHNOLOGY MANAGEMENT 524 (TCMG 524)

### **Statistical Quality Control Techniques**

This course presents a comprehensive summary of methods for managing quality and continuous process improvements. The course objective is to develop an operational familiarity with contemporary methods found to be effective. Topics covered include statistical process control, quality function deployment, concurrent design, the house of quality, the Taguchi method, Six Sigma, lean and others. It also covers continuous process improvement methodologies and techniques. This course is intended for those students who do not plan to specialize in quality management.

*3 semester hours*

TECHNOLOGY MANAGEMENT 530 (TCMG/ MEEG 530)

### **Foundations of Manufacturing Management**

The objectives of the course are to understand and apply concepts and techniques in manufacturing management. The course includes the management of people (both traditional and high performance systems), lean manufacturing techniques as used on the factory floor, and recent concepts such as Factory Physics. The course focuses on those issues that are important in supervising and managing a modern manufacturing operation.

*3 semester hours*

TECHNOLOGY MANAGEMENT 534 (TCMG 534/ MGMT 535)

### **Strategic Sourcing and Vendor Management**

This course covers the rewards and risks of outsourcing and vendor management and identifies where outsourcing should be used and not used. The objectives of the course are to help students understand how to plan, direct, manage and more effectively participate in outsourcing initiatives in terms of the feasibility of outsourcing (off-shore, near-shore, rural-shore, best shore), vendor selection, contract negotiation, vendor management and evaluation, risk assessment and terminating

outsourcing deals.

*3 semester hours*

TECHNOLOGY MANAGEMENT 559 (TCMG 559/ MGMT 560)

### **Foundation of Business Process and Operations Management**

Students in this course apply the methods to projects of their own design and choosing, employing systems designed for application to process management issues. Emphasis is put on quantitative and data-based problem-solving and decision-making processes applied by the professional manager for the improvement of product or service development quality and customer satisfaction. Business process improvement techniques such as lean, Six Sigma and others will be covered.

*3 semester hours*

TECHNOLOGY MANAGEMENT 572 /MECHANICAL ENGINEERING 572 (TCMG/MEEG 572)

### **Production Technology and Techniques**

This course will introduce up-to-date technology, techniques and systems of the global manufacturing industry. American manufacturing situation would be analyzed and Japanese manufacturing success is also explored. Comprehensive and readable description of manufacturing practice is researched.

*3 semester hours*

TECHNOLOGY MANAGEMENT/MECHANICAL ENGINEERING 573 (MEEG/ TCMG 573/MKTG 565)

### **Supply Chain Management**

This course aims at not only covering high-level supply chain strategy and concepts, but also to providing students with a solid understanding of the analytical tools, to understand supply chain design, planning, and operation driven the performance of a firm. It also conveys how supply chain drivers used on a conceptual level during supply chain design and operation leading to performance improvement.

*3 semester hours*

TECHNOLOGY MANAGEMENT / MECHANICAL ENGINEERING 574 (MEEG/ TCMG 574)

### **Principles of Logistics**

This course presents materials management, logistics theory and concepts in today's manufacturing and commercial environments. It integrates all of the functional areas of the business as well as incorporating logistics into corporate operation. They are examined in light of how they interrelate with other functions for the firms.

*3 semester hours*

MECHANICAL ENGINEERING 575 (MEEG 575)

### **Manufacturing Strategy**

## Technology Management Doctoral Seminars • Traditional Chinese Medicine

This course provides the necessary strategic perspective for manufacturing managers' sights and sustaining manufacturing excellence in the competitive manufacturing environment. The strategic perspective of manufacturing forms the approach that places these issues within the rightful context. It emphasizes the essential requirement to link with other functions in order to determine the best strategies for the business as a whole.

*3 semester hours*

TECHNOLOGY MANAGEMENT 577X (TCMG/MEEG 577X)

### Lean Manufacturing

Lean manufacturing is a philosophy based on the elimination of waste in the production system. Use of various concepts such as flow, just-in-time, lead times, inventory turns, standardized work, pull systems, value streams, quick changeover, workplace organization, and visual controls are covered with the focus on improving manufacturing system performance.

*3 semester hours*

TECHNOLOGY MANAGEMENT 578X (TCMG 578X)

### Six Sigma

Six Sigma is a methodology and set of quality management tools (especially statistical methods) used to improve the quality of process outputs, identifying and removing the causes of defects or errors and minimizing variability in manufacturing and business processes. This course teaches the core methods and philosophy of Six Sigma. Develop the leadership skills needed to drive Six Sigma and change effectively.

*3 semester hours*

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## Traditional Chinese Medicine

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### Acupuncture Practice and Techniques (APT):

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The ten (10) acupuncture courses introduce students to the theoretical and practical information of acupuncture therapy. The student becomes proficient in the clinical applications of acupuncture, moxibustion, cupping, electrical stimulation, and bleeding techniques. The student learns to identify acupuncture points by anatomical location, palpation, and proportional measurement. The classification, function and indications for each acupuncture point are discussed and demonstrated. In addition to the twelve

bilateral channels, two midline vessels and six other extra meridians, forbidden and contraindication of points are discussed. In addition, extra points, auricular points and other categories of acupuncture points are demonstrated and treatment techniques based on these extra meridians and points are discussed and practiced.

APT 511

#### Point Location 1

This course will serve as the foundation of the acupuncture point selection series. Meridian theory using concepts of the Jing Luo system, including main and secondary vessels will be reinforced. This course provides the student with the knowledge and skills to physically locate acupuncture points of the lung, large intestine, stomach and spleen, heart and small intestine, urinary bladder, kidney, and pericardium channels. Students will focus on how to locate points effectively, accurately, and quickly as preparation for clinical application as well as college and national examinations. Students will also learn the major function(s) and indication(s) of the Lung, Large Intestine, Stomach, Spleen, Heart, Small Intestine, Urinary Bladder, Kidney and Pericardium channel points. Co-requisite/Prerequisite: ATD 513 TCM Diagnosis 1, ABS 511 Anatomy 1. *1.5 lecture hours, 1 laboratory hour, 2 semester credits.*

APT 523

#### Point Location 2

This is a continuation of the previous course and will focus on the Triple Warmer, Gall Bladder, Liver, Governing Vessel ("Du"), Conception Vessel ("Ren") and extra points. Additional instruction is given in regional point selection and point combinations. Prerequisites: ATD 513 TCM Diagnosis 1, ABS 511 Anatomy 1. *1.5 lecture hours, 1 laboratory hour, 2 semester credits.*

APT 512

#### Meridian Theory

Meridian (a.k.a. Channel) theory is the basis of diagnosis and acupuncture treatment. This course is designed to provide the necessary instruction and training for the student to be familiar with meridian theory including regular, extra and other meridian systems. Corequisite/Prerequisites: ATD 512 TCM Theory and ATD 513 TCM Diagnosis 1. *2 lecture hours, 2 semester credits.*

AWB 501

#### UBAI Clinic Safety Procedures

This course prepares the student for being

able to perform in the UBAI clinic. HIPAA, Occupational Safety and Health Administration (OSHA) standards, UBAI clinic specific safety practices and procedures are presented. The student will practice safe and proper needle removal, pole moxibustion, and electrical stimulation needle techniques. The student will be shown and will practice clinic room set and clean-up procedures and patient draping. A review of fire safety and personal safety procedures will be offered. Completion of this course and passing the clinic HIPAA and OSHA BBP quizzes is required before performing any duties in the UBAI clinic. Prerequisites: none. *0.5 lecture hours, 0.5 semester credits.*

AWB 521

#### TCM Safe Practices

This course prepares the student for emergency situations both in and out of the office. CCAOM Clean Needle Technique and a review of Occupational Safety and Health Administration (OSHA) standards are presented. In addition the student will practice safe and proper needling, moxibustion, electrical stimulation and cupping techniques. Allopathic treatments along with natural remedies for common complications of acupuncture and related therapies are discussed. CPR certification in emergency procedures is achieved. Prerequisites: none. *1 lecture hours, 1 lab hour, 1.5 semester credits.*

APT 614

#### Acupuncture Techniques 1

This course covers the basic principles of acupuncture treatment for diseases involved with different pathogenic factors, tissues and organs. Special point selection based on Root-Branch, Origin-End, Path of Qi, Five Element and Eight Parameter diagnoses are covered. Indications and contraindications of moxibustion, scalp acupuncture and electrical acupuncture stimulation are covered. Prerequisites: APT 511 and APT 523: Point Location I and II. *2 lecture hours, 2 laboratory hours, 3 semester credits.*

APT 625

#### Acupuncture Techniques 2

This course covers functions, indications and needling methods of the Well, Spring, Stream, River, Sea, Source, Luo, Xicleft, Back Shu, Front Mu and Lower He-Sea, Eight Influential, Eight Confluent and important crossing points. Continuing practice in needling, moxibustion and cupping techniques is included. In addition, the prevention and treatment of acupuncture complications is covered. Prerequisite: APT

# Traditional Chinese Medicine

614 Techniques I.

2 lecture hours, 2 laboratory hours, 3 semester credits.

APT 626

## **Auricular & Scalp Acupuncture**

This course introduces the student to various forms of microsystem acupuncture, focusing on auricular and scalp systems. The student learns the respective maps of the scalp and ear, clinical applications and treatment strategies. Corequisite/Prerequisite: APT 614 Acupuncture Techniques I,

1 lecture hour, 1 semester credit.

APT 718

## **Pediatric Acupuncture**

The special diagnostic and treatment skills required for the treatment of patients less than 12 years of age are discussed. The balance of safety for the patient and treatment efficacy is emphasized. Prerequisite: ATD 524.

1 lecture hour, 1 semester credit.

APT 637

## **Japanese Acupuncture Techniques**

This course covers the unique treatment strategies and protocols developed by Japanese acupuncture masters. Prerequisite: APT 614 Acupuncture Techniques I.

1 lecture hour, 1 semester credit.

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## **Asian Medicine Theory, Diagnosis and Application (ATD):**

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The thirteen (13) traditional Chinese medicine theory and diagnosis courses are designed to provide the student with an understanding of the scope, philosophy, theory and conceptual frame work of Chinese medicine and how acupuncture and related treatments specifically affect the body within the TCM treatment paradigms. Emphasis is placed on Traditional Chinese Medicine (TCM) diagnoses and effective treatment strategies.

ATD 511

## **TCM History and Philosophy**

The student studies the different eras of Chinese history and the effects on Traditional Chinese Medicine theories. This course includes the study of the development of Naturalism, Philosophical and Religious Taoism, Confucianism, and Buddhism and their contributions to Chinese Medicine. For each philosophy, the course examines how the philosophy views the human relationship to nature, and the human relationship to the universe. In addition, the impact of philosophy and religion on the

TCM medical paradigm is explored. Prerequisite: none.

1 lecture hour, 0 laboratory hours, 1 semester credit.

ATD 512

## **TCM Medical Theory**

This course includes the classic theories of yin and yang and the Five phases that are fundamental to understanding the TCM medical relationship between humans and the universe. Normal physiology is studied through the fundamental substances (Qi, Blood, Essence, Spirit and bodily fluids), and organs. The basic theory of illness and diagnosis using four examinations (sight, listening and smelling, palpation, and asking) and Eight parameters are covered. Co/Pre-requisites: Anatomy and Physiology.

2 lecture hours, 2 semester credits.

ATD 513

## **TCM Diagnosis 1**

The basic theory and characteristics of the pathogenesis and pathogenic factors are covered including the seven emotions, disharmony of Yin and Yang, abnormalities in Qi, Blood, Spirit, Essence and Bodily fluids, and organ (zang-fu) disharmonies are covered. Techniques in inquiry, palpation, tongue and pulse diagnosis are covered. Diagnoses incorporating the eight parameters as well as root and stem concepts are covered for each of the twelve zang-fu. Prerequisite/Co-requisite: ADT 512 TCM Medical Theory.

2 lecture hours, 2 semester credits.

ATD 524

## **TCM Diagnosis 2**

This course will provide the student with further understanding of Traditional Chinese Medicine diagnosis, expanding on concepts from TCM Diagnosis I. Traditional Chinese Medicine organ diagnoses, eight principle and febrile disease diagnoses will be stressed. In addition, treatment principles and acupuncture treatments based on these diagnostic systems will be explored. Differential diagnoses of common disease entities will be explored. Students will also continue to practice pulse and tongue diagnosis. Prerequisite: ADT 513 TCM Diagnosis 1.

2 lecture hours, 2 semester credits.

ATD 526

## **Seminar 1**

This course will help the student to negotiate their first year in the Acupuncture program. The student will be guided through overviews

of Chinese Medicine as preparation for integrating material from the entire curriculum. The student will review and update Chinese Medical terminology as well as the range of resources and the different perspectives on this terminology and the concepts contained therein. Diagnostic practical skills such as pulse and tongue diagnosis will be reviewed in a practical group setting. In addition the student will apply concepts of information literacy and its use case studies. Prerequisites: none.

1 lecture hours, 1 semester credits

ATD 529

## **Seminar 2**

This course will be a continuation of seminar one. The student will be guided through the application and integration of concepts and skills acquired in the first and second semester curricula. The student will apply these through the use of case studies and clinical examples. The basics of applying diagnosis and generation of treatment principles will be reinforced in a collegial setting. Group activities such as case analysis, pulse and tongue analysis and grand rounds will also be reviewed with a deepening understanding of clinical applications of such. Prerequisites: ATD 515.

1 lecture hours, 1 semester credits

ATD 618

## **Seminar 3**

This course will help the student gain a deeper understanding of case study skills necessary to become a TCM clinical practitioner. The student will be guided through case study, case analysis and pattern differentiation as utilized in clinical practice as preparation for integrating material from the entire curriculum into the clinical setting. Case presentations and clinical skills utilizing a problem based learning format using TCM principles and evidence-informed clinical practice skills are emphasized. The focus of the case studies for this course is mental/emotional disorders, patterns associated with emotional disorders, and the impact of emotional issues in the acupuncture clinic. In addition, the student will gain a basic understanding of the ethical and counseling issues surrounding licensed practice in the field of Traditional Chinese Medicine. Prerequisites: ATD 529.

1 lecture hours, 1 semester credits.

ATD 711

## **Differential Diagnosis and Pathomechanisms**

This course compares and contrasts diagnosis and treatment between Western and TCM di-

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agnoses. Western medical diagnosis of these diseases is incorporated so that the student is able to collaborate with western physicians. Major and common categories of diseases including respiratory tract, infectious, gastrointestinal, genitourinary and musculoskeletal diseases are covered. Prerequisite: ADT 513 TCM Diagnosis I.  
*2 lecture hours, 2 semester credits.*

ATD 715

## TCM Internal Medicine

This course focuses on the diagnosis and TCM treatment of major illness. Treatment planning includes acupuncture, qi gong, and massage. Diagnoses cover respiratory illnesses, gastrointestinal, genitourinary, gynecological, and psychological illnesses. Root-stem, Meridian, Substance and 5 Element treatments are included. Prerequisite: ATD 513 TCM Diagnosis I.  
*2 lecture hours, 2 semester credits.*

ATD 717

## Advanced Tongue and Pulse Diagnosis

This course is designed to increase the diagnostic skills and clinical applications of these uniquely TCM diagnostic parameters. The student studies healthy and diseased tongues and pulses and discusses how findings in these areas change the treatment principles and strategies. Case studies from the clinical education are used to increase both depth and breadth of skill. Prerequisite: ADT 524: TCM Diagnosis 2  
*1 lecture hour, 1 semester credit.*

ATD 727

## Case Studies 1

The student will be guided through case study, case analysis and pattern differentiation as utilized in clinical practice as preparation for integrating material from the entire curriculum into the clinical setting. Case presentations and clinical skills are emphasized through a problem based learning format using TCM principles as the foundation. Emphasis for this class is on cases associated with problems of fluid dynamics and chronic pain, which are frequent chief complaints in the TCM clinical setting. Prerequisite: ATD 529 Seminar 2.  
*1 lecture hour, 1 semester credit.*

ATD 728

## Case Studies 2

Students learn to transition from the development of pattern diagnosis to TCM treatment principles which then lead to point and modality applications. Emphasis is placed on an accurate assignment of symptoms to pattern diagnosis; logical treatment principles reflect-

ing the priorities and totality of the patterns diagnosis; and the most efficacious acupuncture point and adjunctive modality prescriptions to help the patient achieve health. Prerequisite: ATD 529 Seminar 2.  
*1 lecture hour, 1 semester credit.*

ATD 729

## Acupuncture Gynecology

This course is designed to familiarize the student with TCM diagnosis and acupuncture treatments of common gynecologic conditions. Special emphasis is placed on understanding those points forbidden to needle or moxa in cases where the patient's pregnancy status is unknown. Prerequisite: ADT 524: TCM Diagnosis 2.  
*1 lecture hour, 1 semester credit.*

ATD 742

## TCM Geriatrics

This course is designed to familiarize the student with TCM diagnosis and acupuncture treatments that apply to elderly patients. Special emphasis is placed on understanding the physiological changes that affect the health of the elderly from both a TCM and biomedical perspective. Acupuncture and herbal treatments, their indications and contraindications will be discussed. Prerequisites: ADT 524 TCM Diagnosis 2, ATD 728 Case Studies 2, ACH 635 CH Formulae 1. 1 lecture hour, 1 semester credit.

## Western Biomedicine (AWB)

The fifteen (15) biomedical courses are designed to train the student fully about western medical terms, history taking, physical exam and diagnostic skills. The student learns how to make the appropriate referral and consultation, as well as the clinical relevance of laboratory and diagnostic tests and procedures.

ABS 511

## Anatomy 1

This course provides an in-depth study of the macroscopic human anatomy and covers the structure of the trunk and neck regions. Clinical aspects of the vascular and neurological relationships of these regions are emphasized. Instruction includes lectures and interactive media software. Prerequisite: none.  
*4 lecture hours, 4 semester credits.*

ABS 522

## Anatomy 2

This course is a continuation of Anatomy 1 and covers the structure of the head and ex-

tremities. Clinical aspects of the neurological and vascular relationships of these regions is emphasized. Prerequisite: ABS 511 Anatomy 1.  
*4 lecture hours, 4 semester credits.*

ABS 515

## Physiology 1

This course emphasizes the function of cellular structures which regulate homeostasis as well as their role in cell division and genetic control of protein synthesis. Emphasis is placed on the role of the cell membrane in the control of cellular events. The effects of physiology on hormones, their role in homeostasis, and the functional changes associated with homeostasis are considered. Prerequisite: none.  
*2 lecture hours, 2 semester credits.*

ABS 525

## Physiology 2

This course is a study of physiology at the organ and systems level. Included is the study of the circulatory, respiratory, renal, cardiovascular, gastrointestinal and urogenital systems. Also included is the study of the endocrine system and its interrelationships with various organs and systems. There is an integration of normal physiology with pathophysiology and clinical concepts. Prerequisite: ABS 515.  
*2 lecture hours, 2 semester credits.*

AWB 523

## Pharmacology

This course examines the most commonly used pharmacologic agents to be encountered in the clinical setting. The general principles of pharmacology (pharmacodynamics and pharmacokinetics) are covered. Uses and side effects of antibiotics, anti-inflammatory agents, hormones and cardiac drugs are surveyed. Drug-nutrient and drug-herb interactions are discussed. Prerequisite: none.  
*1 lecture hour, 1 semester credit.*

AWB 725

## Pharmacology 2

This course builds on the basic information in Pharmacology 1 to expand the student's understanding of pharmacology, including mechanisms of action; absorption, distribution, metabolism, and excretion (pharmacokinetics/pharmacodynamics); interactions with other drugs and with herbs/food; problems with special populations (prenatal, neonatal, elderly); rational drug usage for clinical disorders (therapeutics); clinical effects of drugs (by category); and toxicology. Prerequisite: AWB 523 Pharmacology 1.  
*2 lecture hours, 2 semester credits.*

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AWB 621

## Medical Ethics

This course is designed to provide the student with a basic understanding of the ethical issues surrounding practice in any medical field. Upon completion of this course, the student will be able to identify concepts of medical and professional ethics as they apply to the practice of health care. Prerequisites: none  
*1 lecture credit, 1 semester credit.*

ACS 611

## Pathology 1

This course is a study of the pathophysiological process and how this process alters the gross, microscopic and clinical manifestations of disease. Basic pathological processes of inflammation, repair, degeneration, necrosis, immunology and neoplasia are presented. Prerequisite: ABS 525 Physiology 2.  
*2 lecture hours, 2 semester credits.*

ACS 624

## Pathology 2

This course is the continuation of the pathological processes of various diseases. This course emphasizes the basis of systemic diseases of the cardiovascular, respiratory, gastrointestinal, urogenital, endocrine, hepatobiliary, renal and pancreatic systems. Prerequisite: ACS 611 Pathology 1.  
*4 lecture hours, 4 semester credits.*

ACS 612

## Clinical Diagnosis 1

This course covers the techniques used for physical examination for various systems of the body. Skills taught develop an appreciation for normal variations and abnormalities associated with disease states. The student is taught to recognize the signs and symptoms of common diseases. Prerequisites: ABS 511, ABS 521, ABS 515, ABS 252.  
*3 Lecture hours, 2 lab hours, 4 semester credits.*

ACS 623

## Clinical Diagnosis 2

This course is a continuation of Clinical Diagnosis 1. Prerequisite: ACS 612.  
*3 lecture hours, 2 lab hours, 4 semester credits.*

ACS 613

## Lab Diagnosis 1

This course introduces the student to the appropriate use and interpretation of laboratory tests. Prerequisites: ABS 521 and ABS 525.  
*2 lecture hours, 2 semester credits.*

ACS 626

## Laboratory Diagnosis 2: Nutritional and functional

## analyses

This course will educate the student on nutritional assessment to include health, diet and lifestyle history, physical measurements, and laboratory testing to include analysis of blood, stool, saliva and urine. The course will integrate use of these measurements in the design of an appropriate nutritional protocol for the client. The student will also learn effective client management and follow-up. Prerequisites: Clinical Diagnosis 1, Lab Diagnosis 1.

ANT 521

## Nutrition

This course provides the foundation for therapeutic nutrition. It explores the biochemistry of macronutrients as well as vitamins and minerals. Deficiencies, toxicities, therapeutic uses and appropriate doses are examined. An assessment of dietary needs and the application of therapeutic nutrition in treating individual diseases and syndromes are also taught. Prerequisites: none.  
*2 lecture hours, 2 semester credits.*

ACS 625

## Physical Exam Skills

This course helps students develop the skills necessary to conduct screening physical exams and specialty exams useful in the ambulatory practice. The student will learn the appropriate exam and physical diagnostic procedures that correspond with the patient's chief complaint and medical history. Clinical decision making and identification of clinical red flags are emphasized. Physical examination skills: Cardio, Chest/Pulmonary, Abdomen/GI, Neuro, General screening exam, physical exam of the spine, physical exam of the major joints (shoulder, elbow, hip, knee, foot). Prerequisite: ACS 612 Clinical Diagnosis 1.

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## Asian/Chinese Herbology (ACH)

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The ten (10) courses in Chinese Herbology offer the student a thorough understanding of Chinese Materia Medica, Classical and Patent formulas and modifications, and the clinical application of Chinese herbs and formulae. The student becomes proficient in the theories pertinent to Chinese Herbal Medicine and the clinical applications of Chinese materia medica for a wide variety of clinical situations and patient populations. At the completion of the 10 course survey, students will have learned over 300 individual herbs and over 150 different classical and patent formulae.

ACH 511

## Chinese Formula and Constituents 1

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on herbs from the Release Exterior, Clear Heat, and Drain Downwards categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Prerequisites: ATD 524 TCM Diagnosis 2.  
*2 lecture credits, 36 hours*

ACH 512

## Chinese Formulae and Constituents 2

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on Herbs from the Regulate Qi, Regulate and Invigorate Blood, Warm Interior and Expel Cold, Tonify (Qi and Blood) categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Prerequisites: ATD 524 TCM Diagnosis 2.  
*2 lecture credits, 36 hours.*

ACH 523

## Chinese Formulae & Constituents 3

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on Herbs from the Drain Damp, Transform Phlegm and Stop Cough, Aromatic Herbs that Transform Damp, Food Stagnation categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Prerequisites: satisfactory progress in first year curriculum. Co/Prerequisites: ACH 512 Chinese Formulae and Constituents 2  
*2 lecture credits, 36 hours.*

ACH 524

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## Chinese Formulae and Constituents 4

The student will explore the traditional Chinese Medicine Materia Medica in depth and learn to discriminate between herb categories, their general applications and associated Treatment Principles and individual, unique applications, signs and symptoms. The student will explore at least 100 herbs. This course will focus on Herbs from the Tonify (Yang and Yin), Stabilize and Bind, Calm Shen, Aromatic Substances to Open Orifices, Extinguish Wind and Stop Tremors, Expel Parasites, External Applications categories. In addition at least 10 representative formulae that reflect these categories will be investigated. This course will serve as partial basis for the formulae courses. Co/Prerequisites: ACH 512 Chinese Formulae and Constituents 2.

*2 lecture credits, 36 hours.*

ACH 617

## Chinese Formulae 3

This course will be a continuation and amplification of the previous herbal curriculum with an emphasis on herbal formulae. The student will explore at least 80 formulae including reiterating and expanding content from previous courses. This course will focus on formulae that Stabilize and Bind, Calm the Spirit, Open the Sensory Orifices, Regulate Qi, Regulate Blood, Expel Wind, Treat Dryness, Expel Dampness, Dispel Phlegm, Reduce Food Stagnation, Expel Parasites, Treat Abscesses and Sores, and for External Application. The student will learn the name, actions, indications, cautions and contraindications of the classical base formulae according to the traditional categorization based on treatment principles. In addition the student will explore the traditional structure of herbal formulae as a prelude to formula modification (general, assistant, etc.) In addition the student will review and reiterate content from the Formulas and their constituents. Prerequisites: ACH 635

*2 lecture credits, 36 hours.*

ACH 619

## CH Internal Medicine & Modifications 1

This course will be a continuation and amplification of the previous herbal curriculum with an emphasis on internal medicine applications of herbal formulae. The student will reexamine previously studied herbs and formulae from previous courses with special attention to clinical application and formula modification according to clinical presentation. Prerequisites: ACH 636

*2 lecture credits, 36 hours.*

ACH 628

## CH Internal Medicine & Modifications 2

This course will serve as a companion course to ACH 619. This course will be a continuation and amplification of the previous herbal curriculum with an emphasis on internal medicine applications of herbal formulae. The student will reexamine previously studied herbs and formulae from previous courses with special attention to clinical application and formula modification according to clinical presentation. Prerequisites: ACH 617, ACH 619

*2 lecture credits, 36 hours.*

ACH 635

## CH Formulae 1

This course will be a continuation and amplification of the previous herbal curriculum (ACH 511, ACH 512, ACH 523, ACH 524) with an emphasis on herbal formulae. The student will explore at least 30 formulae including reiterating and expanding content from previous courses. This course will focus on formulae that Release the Exterior, Clear Heat, and Drain Downward. The student will learn the name, actions, indications, cautions and contraindications of the classical base formulae according to the traditional categorization based on treatment principles. In addition the student will explore the traditional structure of herbal formulae as a prelude to formula modification (general, assistant, etc.). In addition, the student will review and reiterate content from the formulas and their constituents. Prerequisites: ACH 511, ACH 512

*2 lecture credits, 36 hours.*

ACH 636

## Chinese Formulae 2

This course will be a continuation and amplification of the previous herbal curriculum (ACH 511, ACH 512, ACH 523, ACH 524) with an emphasis on herbal formulae. The student will explore at least 30 formulae including reiterating and expanding content from previous courses. This course will focus on formulae that Harmonize, Dispel Summerheat, Warm Interior Cold, Release Exterior-Interior Excess, and Tonify. The student will learn the name, actions, indications, cautions and contraindications of the classical base formulae according to the traditional categorization based on treatment principles. In addition, the student will explore the traditional structure of herbal formulae as a prelude to formula modification (general, assistant, etc.). Prerequisites: ACH 511, ACH 512, ACH 523, ACH 524

*2 lecture credits, 36 hours.*

ACH 641

## CH Special Topics

This course will explore special topics in TCM herbal medicine. These will include but not be limited to dui yao (herb combinations and modules), external applications, pediatrics, classical formulae from seminal texts. Content will also reflect the availability of special guest lecturers. A capstone project is required for completion of the course. Prerequisites: ACH 619

*2 lecture credits, 36 hours.*

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## Herbal Medicine Survey (AHM)

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The seven (7) courses in herbal medicine and dietetics give the student a basic introduction to Chinese pharmacy and dispensary practices, common OTC North American botanicals, the ethical consideration of utilizing sparse resources, and TCM clinical diet therapies. Information in the western botanical and pharmacy classes provides clear information regarding indications, contraindications and drug-herb interactions. The ethical and ecological impacts of TCM materia medica on the health of the individual and the world are explored. In addition, the two courses in dietetics and nutrition help the student understand the role of nutrition in patients' health. (Note that the course in western nutrition is listed under Western Biomedicine: ANT 521 Nutrition.)

AHM 634

## Dispensary Management

This course will develop knowledge and skills related to TCM dispensary management. Students will learn how to support the clinical and health promotion work of the peripheral dispensary by keeping all needed support systems running well. Prerequisites: none

*1 lecture credit, 18 hours.*

AHM 635

## Pharmacognosy and Pharmacology of Chinese Herbs

Chinese material medical are often prescribed in complex formulae. Understanding the chemistry, interactions, extraction methodology, and drug interactions allows AOM practitioners better insights to possible adverse effects, from drug-herb interactions, herb toxicities to lack of expected (or any) outcomes from prescribed formulae. Several recorded incidents of adverse reactions have occurred to Chinese herbs over the past 12 years. In most cases, the incidents have involved multiple patients consuming the same or similar substance, rather than isolated case reports. It is important to review the

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unique aspects of Chinese medicine) which are of relevance to understanding these issues. Prerequisites: ACH 523 Chinese Herbal Theories & Triple burner theories.

*1 lecture credit, 18 hours.*

AHM 612

### **Introduction to Chinese Herbal Remedies.**

This survey course introduces the student to the diagnostic and treatment strategies specific to TCM herbal therapies. The student is introduced to major herbs and formulas of China, their uses, contraindications and drug-herb interaction. Patient safety issues are also addressed. Prerequisite: ATD 513 TCM Diagnosis 1.

*1 lecture hours, 1 semester credit. 18 hours*

AHM 616

### **Ethical and ecological considerations of Chinese materia medica**

The traditional practice of using endangered species (plant and animal) is controversial within TCM. Comprehensive Chinese herbal textbooks often discuss substances derived from endangered species, emphasizing alternatives. Poaching and black market issues with animal products, particularly tiger bone, rhinoceros horn, seahorse and bear bile have all raised ethical and ecological concerns in the use of Traditional Chinese formulae. In this course, we will discuss the ethical and ecological impacts of TCM materia medica on the health of the individual and the world. Prerequisites: none

*1 lecture credit, 18 hours.*

AHM 613

### **Traditional Chinese Dietetics**

This class introduces the student to the eastern understanding of how food influences human health. Foods and food products are surveyed according to Asian categorization. Food groups are categorized by nature, temperature, taste, element, indications and contraindications. Treatment of the major categories of organ (zang-fu) disorders using foods and food combinations are covered. Prerequisite: ADT 513 TCM Diagnosis I.

*2 lecture hours, 2 semester credits.*

AHM 521

### **Botanical Medicine**

This course comprises a survey of plant and plant preparations most commonly used in Western traditions. The actions of the plant and plant products, as well as drug-herb interactions are considered. Prerequisites: ABS 515, ACS 611.

*3 lecture hours, 3 semester credits*

AHM 713

### **Patent Remedies.**

This course will survey over 150 prominent, TCM, topical and internal herbal, patent formulas. Students will be introduced to pattern-specific uses of these formulas and subsequently, their contraindications, toxicities and potential drug interactions. Safety, legal, and manufacturing issues will also be highlighted. Prerequisite: AHM 612: Introduction to Chinese Herbal Remedies.

*2 lecture hours, 2 semester credits.*

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### **Movement, Respiration and Bodywork Studies (AMR)**

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The seven (7) movement and respiration courses are designed to enhance the student's personal and energetic development. The student will be exposed to a wide variety of Asian movement practices that can be used to maintain their own and their patients' health care needs. In addition to the movement studies, courses in soft tissue treatment techniques are offered.

AMR 511

### **Taijiquan 1**

This introductory course in therapeutic movement explores how musculoskeletal alignment, breathing, and mental awareness affect the meridians through practice of this traditional exercise. The emphasis is on analysis of how individual Taijiquan movements circulate Qi through specific meridians in accordance with TCM theory and clinical practice. The student also learns Taijiquan history and safety considerations. Prerequisite: none.

*0 lecture hours, 1.5 laboratory hours, 1 semester credit.*

AMR 522

### **Taijiquan 2**

This is a continuation of Taijiquan 1. In addition to more advanced Taijiquan exercises for Qi circulation, the student learns basic application of Chinese therapeutic movement to the clinic setting. Prerequisite: AMR 511 Tai Ji Chuan 1.

*0 lecture hours, 1.5 laboratory hours, 1 semester credit.*

AMR 613

### **Qigong 1**

This course teaches exercises designed to regulate specific meridians, muscles and joints as well as how to choose, integrate and teach the appropriate exercises in a clinic setting. Prerequisite: AMR 522: Taijiquan 2.

*0 lecture hours, 1.5 laboratory hours, 1*

*semester credit.*

AMR 624

### **Qigong 2**

This course is a continuation of Qi Gong 1. The student learns advanced exercises, meditations, and breathing exercises that can be applied both to the clinic setting as well as to the student's personal experience and development of Qi toward the goal of being a more effective TCM practitioner. Prerequisite: AMR 613 Qi Gong 1.

*0 lecture hours, 1.5 laboratory hours, 1 semester credit.*

AMR 627

### **Tuina 1**

The student learns basic Tuina manipulation theory and techniques to treat acupoints, channels, and soft tissue as well as Qigong conditioning exercises that allow the student to implement Tuina manipulation safely and effectively. The course culminates in learning a Tuina full-body therapeutic protocol. Prerequisite: ABS 522 Anatomy 2.

*1 lecture hour, 2 laboratory hours, 2 semester credits.*

AMR 715

### **Tuina 2**

This course is a continuation of Tuina 1. The student learns intermediate Tuina manipulation theory and techniques to treat acupoints, channels, and soft tissue. Tuina treatments for back pain and conditions of the upper limb are the primary focus. Prerequisite: ATD 513 TCMI Diagnosis 1 and APM 621: Palpation/Massage.

*1 lecture hour, 2 laboratory hours, 2 semester credits.*

AMR 726

### **Tuina 3**

This course is a continuation of Tuina 2. The student learns advanced Tuina manipulation theory and techniques to treat acupoints, channels and soft tissue. Tuina treatments for the leg and internal conditions are the primary focus. Prerequisite: AMR 715 Tuina 2

*1 lecture hour, 2 laboratory hours, 2 semester credits.*

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### **Counseling, Communications and Practice Management**

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The three (3) specific courses in this area enhance the students' clinical skills, both in terms of diagnosing addressing patients' psychological health and in the area of best business practices. In addition, the courses

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of AWB 621 Medical Ethics, ACS 511 Evidence Informed Clinical Practices, and ATD 618 Seminar 3 (cross listed in the ATD section) help students learn the fundamental skills needed for private practice, ethical and legal considerations in health care and special considerations for practice in integrated care settings.

APS 621

### Psychological Assessment

The primary focus of this course is the diagnosis of the various psychiatric diseases according to the Diagnostic and Statistical Manual of Mental Disorders. Included are psychological assessment considerations and treatment modalities. Prerequisites: none.

*2 lecture hours, 2 semester credits.*

APP 721

### Practice Management

Students are taught the current procedural practices for the operation of a private practice. In addition, the practical aspects of operating a practice as a small business are discussed. Students are encouraged to begin thinking about their personal career path as a complementary medicine practitioner in private practice, group practice, hospital-based practice or as an AOM educator. Prerequisites: none.

*2 lecture hours, 2 semester credits.*

APP 722

### Professional Development:

This course will explore the issues associated with ongoing professional development. Professional development assists the acupuncture practitioner to develop the knowledge and skills necessary to further clinical competence and contribute to the body of knowledge in the field during practice after graduation. Prerequisites: ACS 631 Clinical Education 1.

*1.5 lecture credits, 0 lab credits, 1.5 credits total.*

ATD 617

### Seminar 3

(see section above "Asian Medicine Theory, Diagnosis and Application")

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## Clinical Services (ACS)

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The five (5) acupuncture clinical services courses, four (4) Chinese Herbology clinical services, and four (4) Integrative clinical services (for a total of fifteen – 15 – clinical experience courses) are designed to allow the student to develop clinical, interpersonal communication and decision-making skills. In addition, students learn professional con-

duct, efficiency and confidence in dealing with patients on a regular basis. From inception through the end of clinical training, the student has the opportunity to observe and work with advanced TCM practitioners as well as other health care professionals. This allows the student to understand how and when to make appropriate referrals. Clinical rotations are available in the UBAI on-campus clinic as well as in community and hospital outreach clinical sites. In addition, four (4) courses offer clinical skills used for patient care and clinical procedures.

ACS 711

### Preceptorship 1

The students observe and administer care in established acupuncture facilities under the supervision of licensed physicians and acupuncturists. This exposure to a variety of clinical settings helps prepare the student for both private practice and integrative patient care. Prerequisite: Completion of all first year courses.

*0 lecture hours, 4 laboratory hours, 2 semester credits, 75 clock hours total.*

ACS 722

### Preceptorship 2

This is a continuation of ACS 671. Students increase their clinical skills working under a variety of health care professionals, all of whom must have the appropriate credentials to practice in the field of acupuncture. Prerequisite: ACS 671.

*0 lecture hours, 4 laboratory hours, 2 semester credits, 75 clock hours total.*

ACS 631

### Clinical Education 1

Under the supervision of licensed faculty members, the interns start by observing patients for 30 clinic hours, then move into the area of direct patient care. All patient diagnoses and management plans are reviewed and approved by a clinic faculty member prior to the initiation of patient care. The student will begin to practice clean needle technique, removal and disposal of needles. The student will acquire proficiency in tongue and pulse diagnosis. Prerequisite: Pass Clinical Entrance Exam.

*0 lecture hours, 12 laboratory hours, 8 semester credits, 245 clock hours total.*

ACS 712

### Clinical Education 2

Students continue to administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative

requirements necessary for the successful completion of the program. Eligibility for the rotation is successful completion of the previous clinical rotation. Prerequisite: ACS 631 Clinical Education 1.

*0 lecture hours, 12 laboratory hours, 8 semester credits, 215 clock hours total.*

ACS 723

### Clinical Education 3

Students continue to administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the rotation is successful completion of the previous clinical training rotation. Prerequisite: ACS 712 Clinical Education 2.

*0 lecture hours, 12 laboratory hours, 8 semester credits, 220 clock hours total.*

ACC 611

### Chinese Herbal Clinic 1

Under the supervision of licensed faculty members, the interns start by observing patients for 20 clinic hours, then move into the area of direct patient care. All patient diagnoses and management plans are reviewed and approved by a clinic faculty member prior to the initiation of patient care. The student will begin to prescribe individual herbs and formulae for patient care. The student will acquire proficiency in TCM diagnostic techniques, as well as in understanding when specific herbs or formulae may not be prescribed based upon possible herb-drug interactions.

*0 lecture hours, 4 lab credits, 130 clock hours total.*

ACC 632

### Chinese Herbal Clinic 2A

Students continue to administer Chinese herbal care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the course is successful completion of the previous clinical rotation. Prerequisite: ACC 611 Chinese Herbal Clinic 1.

*0 lecture hours, 2 lab credits, 65 clock hours total.*

ACC 723

### Chinese Herbal Clinic 2B

Students continue to administer Chinese herbal care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the quali-

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tative and quantitative requirements necessary for the successful completion of the program. In addition to utilizing prepared formulae, student interns now begin to mix herbal powders in individualized formulae. Eligibility for the course is successful completion of the previous clinical rotation. Prerequisite: ACC 611 Chinese Herbal Clinic 1. Co-Requirement ACC 632 Chinese Herbal Clinic 2A.

*0 lecture hours, 2 lab credits, 65 clock hours total.*

ACC 724

### Chinese Herbal Clinic 3

Students continue to administer care to patients under the supervision of licensed faculty. Students will integrate herbal therapies with dietary advice and qi enhancement techniques. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the course is successful completion of the previous clinical rotation. Prerequisite: ACC 723 Chinese Herbal Clinic 2B.

*0 lecture hours, 3 lab credits, 100 clock hours total.*

ACS 811

### Grand Rounds 1

This course is designed to train the AOM student to communicate effectively, orally and in writing, with patients and their families, colleagues, and others with whom health-professionals must exchange information in carrying out their responsibilities in patient care. Prerequisites: ACS 731 Clinical Procedures, ATD 715 TCM Internal Medicine; ACC 611 Chinese Herb Clinic 1. Co-requisite: ACC 812 Integrated Clinical Education 1.

*2 lecture credits, 0 lab credits, 2 credits total.*

ACS 812

### Integrated Clinical Education 1

Rotations in the Integrative clinic shifts combine AOM supervisors for AOM diagnosis and treatment with biomedical practitioners and other clinicians offering medical care in a variety of health settings. Students administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Prerequisites: ACS 712 Clinical Education 2; ACC 632 Chinese Herbal Clinic 2A.

*215 hours; 150 patient visits; at least 90 hours in off-site clinics.*

ACS 814

### Integrated Clinical Education 2

This is a continuation of the integrative clinical training started in ACS 812. Rotations in the Integrative clinic shifts combine AOM supervisors for AOM diagnosis and treatment with biomedical practitioners and other clinicians offering medical care in a variety of health settings. Students continue to administer care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Prerequisites: ACS 712 Clinical Education 2; ACC 632 Chinese Herbal Clinic 2A. ACC 812 Integrated Clinical Education 1.

*215 hours; 150 patient visits; at least 90 hours in off-site clinics.*

ACS 823

### Grand Rounds 2

This course is designed to train the advanced AOM student to communicate with other health care providers to determine an appropriate plan of care. This includes the ability to assess written diagnostic reports, including the range of values that distinguish normal from abnormal findings, as relevant to patient care and communication with other health care providers. Upon completion, the student will be able to discuss the clinical scope of AOM in an informed, authoritative, and appropriate manner. Prerequisites: ACS 811 Grand Rounds 1; Co-requisite: ACC 814 Integrated Clinical Education 2.

*2 lecture credits, 0 lab credits, 2 credits total.*

ACS 511

### Evidence-Informed Clinical Practice in Acupuncture

The basic principles of clinical and laboratory research are examined with a special emphasis on the applications of acupuncture and TCM techniques in the research setting. Application of research to case evaluation will be emphasized. Prerequisite: none.

*1 lecture hour, 1 semester credit.*

ACS 724

### Public Health

This course covers current environmental and public health concerns with an emphasis on the role of the acupuncturist in these issues. The course integrates health with diet, water and air pollutants, noise and substance abuse. Recognition of major communicable diseases is included. Prerequisite: ABS 525 Pathology 2.

*2 lecture hours, 2 semester credits. (online*

*course)*

*Offered: Spring semester*

ACS 641

### Diagnostic Imaging

This course covers radiographic anatomy and diagnostic imaging techniques. A basic introduction to imaging, including roentgenology, computerized tomography (CT), magnetic resonance imaging (MRI), ultrasound, and bone scanning are discussed. The basic concepts of these techniques and their use in diagnosis are discussed. Prerequisites: ABS 522 Anatomy 2, ABS 525 Physiology 2.

ACS 731

### Clinical Procedures

This course explores the clinical applications of the skills and knowledge learned to date for patient care in the UB Clinics. In addition, UB Clinics skills including using the electronic health system for charting, and communication with patients and other health providers in the UB Clinics is reviewed. Prerequisites: ACS 623 Clinical Dx 1, ATD 72 Case Studies 1, AWB 621 Medical Ethics.

*0.5 lecture credits, 0 lab credits, 0.5 credits total.*

ACS 715

### Physical and Functional Assessments of the UB Health Sciences

This course is designed to teach the student general principles and practices of health care from the breadth of providers trained at the University of Bridgeport. The naturopathic, chiropractic, nutrition, dental hygiene and physician assistant history and scope of practice will be discussed. Practical applications of these disciplines in the area of physical and functional assessment of patients will be emphasized. Corequisites: ACS 623 Clinical Diagnosis 2, ACS 613 Lab Diagnosis 1.

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## Clinical Education (ACC)

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The four (4) Chinese Herbology clinical services are designed to allow the student to develop clinical, interpersonal communication and decision-making skills. From inception through the end of clinical training, the student has the opportunity to observe and work with advanced TCM practitioners. Clinical rotations are available in the UBAI on-campus clinic as well as in community outreach clinical sites. By the end of clinical training, each student will have seen a minimum of 200 patient visits and will have completed 360 hours in the herbology clinic.

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## Traditional Chinese Medicine

ACC 611

### Chinese Herbal Clinic 1

Under the supervision of licensed faculty members, the interns start by observing patients for 20 clinic hours, then move into the area of direct patient care. All patient diagnoses and management plans are reviewed and approved by a clinic faculty member prior to the initiation of patient care. The student will begin to prescribe individual herbs and formulae for patient care. The student will acquire proficiency in TCM diagnostic techniques, as well as in understanding when specific herbs or formulae may not be prescribed based upon possible herb-drug interactions. Prerequisite: *0 lecture hours, 4 lab credits, 130 clock hours total.*

ACC 632

### Chinese Herbal Clinic 2A

Students continue to administer Chinese herbal care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the rotation is successful completion of the previous clinical rotation. Prerequisite: ACC 611 Chinese Herbal Clinic 1. *0 lecture hours, 2 lab credits, 65 clock hours total.*

ACC 723

### Chinese Herbal Clinic 2B

Students continue to administer Chinese herbal care to patients under the supervision of licensed faculty. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. In addition to utilizing prepared formulae, student interns now begin to mix herbal powders in individualized formulae. Eligibility for the rotation is successful completion of the previous clinical rotation. Prerequisite: ACC 611 Chinese Herbal Clinic 1. Pre/Co-Requisite ACC 632 Chinese Herbal Clinic 2A. *0 lecture hours, 2 lab credits, 65 clock hours total.*

ACC 724

### Chinese Herbal Clinic 3

Students continue to administer care to patients under the supervision of licensed faculty. Students will integrate herbal therapies with dietary advice and qi enhancement techniques. Students are monitored as to their progress toward completing the qualitative and quantitative requirements necessary for the successful completion of the program. Eligibility for the

rotation is successful completion of the previous clinical rotation. Prerequisite: ACC 723 Chinese Herbal Clinic 2B.

*0 lecture hours, 3 lab credits, 100 clock hours total.*