



## **CAPITAL REGION CAMPUS**

### **SCHOOL OF EDUCATION**

#### **Degrees Offered**

- Master of Arts in Teaching
- Master of Science for Teachers of Mathematics and Science
- Master of Arts in English, History and English/History

#### **Certificate of Advanced Study Programs**

- Certificate of Advanced Study in Teacher Leadership and Mentoring
- Certificate of Advanced Study in Teacher Leadership and National Board Certification
- Certificate of Advanced Study in Teacher Leadership and Service Learning
- Extension Certificate: Middle Childhood Extension (grades 5-6)

#### **Masters of Art in Teaching**

#### **Program Requirements (16 Courses)**

##### **Prerequisites are:**

- PSY-246 (Educational Psychology) or its equivalent
- One semester of college level second language study or its equivalent
- EDS 500 E (Four days of structured field experiences).

Pre-requisites must be completed before a student enrolls in the intensive summer program, not necessarily before the student is accepted into the program.

##### **Core requirements are (9):**

- EDS 540 (Psychology of Teaching)
- EDS 540L (Psychology of Teaching Laboratory)
- One of the EDS 511-516 courses (Curriculum and Methods of Teaching English, Languages, Mathematics, Sciences, Social Studies or Technology)
- EDS 541 (Essential Reading Literacy)

- EDS 544 (Writing in the Content Classroom)
- EDS 550A (Special Needs Seminar)
- 550B (Seminar on Assessment and Evaluation)
- 550C (Seminar on School Reform)
- CST 570 (Computers in the Language Arts Classroom) or 571 (Computers in the Math & Science Classroom)

**Additional Program requirements (7):**

- One-year teaching internship (EDS 551, 552, 553)
- One-term, classroom-based master’s research project (580)
- Three subject area electives

**The Master of Arts in English, the Master of Arts in History and the Master of Arts in History and English**

**Program Requirements**

**MA in English Program Content:**

Core:

EGL 581	Criticism
EGL 580 or EGL 598/599	MA Project or Thesis
EGL 510	Writing and Teaching: A Process Approach
EGL 523	The American Short Story
EGL 524	Shakespeare; After 1600
EGL 582	The Civil War Era, Interdisciplinary Approaches
EGL 595	Reading Poetry
EGL 596	Reading American Fictions

Electives: Students work with academic advisors to select up to five electives from the Master of Arts in Teaching Program, the Certificates of Advanced Study in Teacher Leadership and Mentoring or Teacher Leadership and National Board Certification, a Middle Childhood Extension, or elective courses such as Literacy, Assessment, or Special Needs Seminar.

**MA in History Program Content**

Core:

HST 580 or HST 598/599	MA Project or Thesis
HST 589	Comparative Social Studies
HST 510	Comparative Global History
HST 511	The Writing and Ratification of the Constitution
HST 582	The Civil War Era, Interdisciplinary Approaches
HST 584	Personality in History
HST 558	The Holocaust
HST 596	The Presidency

Electives: Students work with academic advisors to select up to five electives from the Master of Arts in Teaching Program, the Certificates of Advanced Study in Teacher Leadership and Mentoring or Teacher Leadership and National Board Certification, a Middle Childhood Extension, or elective courses such as Literacy, Assessment, or Special Needs Seminar.

### **The MA for Teachers Project**

In lieu of a thesis, students may enroll in XXX580, which involves carrying out classroom-based research in an academic discipline and related pedagogy. Electing to complete a project usually means completing one more required elective in the discipline than those who complete an MA for Teachers thesis.

## **The Master of Science for Teachers**

### **Program Requirements (11 Courses)**

The Master of Science for Teacher's degree in science or mathematics is awarded for the completion of eleven courses. Normally, six courses are taken in one of three general subject areas: Life Science, the Physical Sciences, or the Mathematics/Computer field. Students interested in the degree must consult an academic advisor in planning their program of study and should matriculate no later than the end of their second course. One or two graduate level courses from other institutions may be transferred into the program, as determined by a faculty advisor.

### **The MS for Teachers Project**

In lieu of a thesis, students may enroll in XXX580, which involves carrying out classroom-based research in an academic discipline and related pedagogy. Electing to complete a project usually means completing one more required elective in the discipline than those who complete an MS for Teachers thesis.

### **Elective Coursework**

MS for Teachers students are normally required to take five elective courses beyond the six courses required in their discipline area selected with the approval of an advisor. Graduate courses in the subject area of certification and in education-related subjects are offered in the late afternoons and evenings of the academic year. With the approval of an advisor up to two graduate-level elective courses may be accepted in transfer.

### **Technology Literacy**

Each student in the MS for Teachers program is expected to leave the program with a greater degree of computer/technology literacy than the degree of literacy with which s/he entered. Students who entered with less than basic computer/technology knowledge are expected to include as an elective at least one of the following: CST 565, 570 or 571, or demonstrate competence in one of those areas.

# **CERTIFICATES OF ADVANCED STUDY**

## **Teacher Leadership and National Board Certification**

Courses required for the Certificate of Advanced Study in Teacher Leadership and National Board Certification

- EDS 610 Reflective Teaching Practice
- EDS 611 Learning to Teach to the Highest Standards
- EDS 624 School Law
- EDS 625 Teacher Leadership

## **Teacher Leadership and Mentoring**

Courses required for the Certificate of Advanced Study in Teacher Leadership and Mentoring

- EDS 621 Mentoring I: Mentoring Interns and Novice Teachers
- EDS 622 Mentoring II: Advanced Mentoring
- EDS 623 Directing a Mentoring Program
- EDS 624 School Law
- EDS 625 Teacher Leadership

## **Teacher Leadership and Service Learning**

Courses required for the Certificate of Advanced Study in Teacher Leadership and Service Learning

- EDS 630 Introduction to Service Learning
- EDS 631 Advanced Service Learning
- EDS 624 School Law
- EDS 625 Teacher Leadership

## **Middle Childhood Extension Program**

The objectives of the Middle Childhood Extension program are to develop teachers' specific literacy and pedagogy knowledge in order to extend a 7-12 certification to the 5<sup>th</sup> and 6<sup>th</sup> grade. This program results in New York State Certification for 5<sup>th</sup> and 6<sup>th</sup> grade in the discipline to which the teacher is primarily certified.

The Middle Childhood Extension Program authorizes teachers who are certified in Adolescence Education, grades 7-12, to teach in their subject matter in grades 5 and 6. The subject matter areas include biology, chemistry, earth science, English, Chinese, French, German, Greek, Latin, mathematics, physics, social studies and Spanish.

### **Program Requirements:**

Required Classes:

- EDS 570 Middle School Students, Structures, and Standards
- EDS 571 Middle Adolescence Literacy

# SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

## Degrees Offered

- Master of Science in Computer Science
- Master of Science in Electrical Engineering
- Master of Science in Mechanical Engineering
- Master of Science in Energy Systems
- Master of Science in Engineering and Management Systems

## Certificates Offered

- Business of Energy (Online)

## Master of Science in Computer Science

### **Program Requirements (9 courses)**

Nine courses numbered 500 or higher, are required, including CSc 511. Three of the nine courses must come from CSc 571, 572 and 583. Two of the nine courses must be either a project (CSc 594–595) or a thesis (CSc 596–597). Students who have extensive software experience may petition to take other graduate-level courses instead of the project/thesis requirement. EER530, from the EER department, may also be used toward the degree.

The nine courses must include a course from each of the core areas:

- Computational theory CSc 512,
- Programming languages CSc 513,
- Software systems CSc 510, CSc 516
- Hardware systems CSc 518, CSc 552

In addition to the nine courses, all candidates are required to participate in the MS Graduate Seminar in Computer Science (CSc 599). This non-credit seminar serves as the capstone experience of the MS in Computer Science degree. It is normally taken in the last year of the candidate's program.

## Master of Science in Electrical Engineering

### **Program Requirements (10 courses)**

A minimum of ten graduate courses and an MS Graduate Project in Electrical Engineering are required. Each student's program should include at least seven electrical engineering courses and up to three electives. Each student should, in conference with the graduate advisor, plan a complete graduate program prior to taking any courses for graduate credit. Students with weak backgrounds may need to take more than ten courses.

Electives should normally be chosen from graduate level courses in electrical engineering, computer science, mechanical engineering, and MBA programs. The advisor

must approve every course taken for graduate credit. A thesis could be considered as one or two technical electives.

All candidates not completing a thesis or independent study (opportunity for thesis or independent study are limited at Capital Region Campus) are required to participate in the MS Graduate Project in Electrical Engineering. This is a non-credit, no-fee project that serves as the culminating experience of the MS in Electrical Engineering degree.

## **Master of Science in Energy Systems**

### **Program Requirements (11 Courses)**

A minimum of 11 graduate courses are required. Each student's program will include at least 5-9 energy related mechanical or electrical engineering courses, 0-4 fundamental technical mechanical or electrical engineering courses, and 2-3 non-technical MS Mechanical/Electrical energy related courses. Each student will, in conference with their graduate advisor, plan a complete graduate program prior to taking any courses for graduate credit. Students with weaker backgrounds may need to take more than 11 courses. The student's advisor will approve every course taken for graduate credit toward this degree.

Graduate courses taken from the School of Engineering and Computer Science will be selected from the following:

- Mechanical Engineering – MS credit bearing Mechanical Engineering courses designated as Energy Related
- Mechanical Engineering – MS credit bearing Mechanical Engineering technical and non-technical courses
- Electrical Engineering – MS credit bearing Electrical Engineering courses designated as Energy Related
- Electrical Engineering – MS credit bearing Electrical Engineering technical and non-technical MS courses

#### **Mechanical Energy Related Courses**

MER 522      MER 551  
MER 560      MER 580  
MER 580A    MER 580B  
MER 580C    MER 580E  
MER 580F    MER 580G  
MER 541

#### **Electrical Energy Related Courses**

EER 522      EER 528  
EER 542      EER 542A  
EER 542B    EER 551  
EER 560      EER 561  
EER 570      EER 580  
EER 580A    EER 580B  
EER 580D    EER 580E  
EER 580G

**Mechanical Non-Technical-  
Energy Related**

MER 600	BOE 610
MER 601	BOE 611
	BOE 612
	BOE 613
	BOE 614
	BOE 615

**Electrical Non-Technical-  
Energy Related**

EER 600	BOE 610
EER 601	BOE 611
	BOE 612
	BOE 613
	BOE 614
	BOE 615

**MSME – Technical**

MER 500	MER 501
MER 502	MER 506
MER 507	MER 508
MER 509	MER 510
MER 512	MER 515
MER 516	MER 525
MER 532	MER 534
MER 536	MER 537
MER 538	MER 540
MER 550	MER 552
MER 553	
MER 554	MER 571
MER 555	
MER 572	MER 573
MER 576	MER 580D

**MSEE Technical**

EER 543	EER 518
EER 548	EER 547
EER 571	EER 552
EER 573	EER 572
EER 576	EER 574

**Master of Science in Mechanical Engineering****Program Requirements (10 courses)**

The MSME requires a total of ten courses. Two of three core courses must be taken by all students: MER 502 (Engineering Analysis) is required by all students and one or both of the following: MER 501 (Transport Phenomena) or MER 500 (Elasticity). Of the remaining eight courses, six must be in the mechanical engineering major. The remaining two courses are selected from engineering (mechanical or electrical), computer science, mathematics, or from the MBA program. Not all courses from these areas are satisfactory selections; therefore all course selections must be approved by the graduate advisor before course registration. Each student must submit a program plan of study (to be approved by the advisor) before completion of the first course taken for graduate credit.

Students can complete the degree by taking ten courses and the MS Graduate Project in Mechanical Engineering noted below. They also have the option of replacing one or two courses with independent research conducted in the form of a Master's Project (one or two course) or a thesis (two courses) with departmental approval (these opportunities are limited). All students, either part-time or full-time, intending to do Research and Thesis must consult the department for appropriate guidance. Part-time students not completing

a Master's Project, thesis, or independent study are required to complete an MS Graduate Project in Mechanical Engineering. This is a non-credit, no-fee project that serves as the culminating experience of the MS in Mechanical Engineering degree.

## **Master of Science in Engineering and Management Systems**

### **Program Requirements (11 Courses)**

A minimum of 11 graduate courses are required. Each student's program should include at least 6 courses from the School of Engineering and Computer Science and 5 courses from the School of Management. Each student should, in conference with their graduate advisor, plan a complete graduate program prior to taking any courses for graduate credit. Students with weak backgrounds may need to take more than 11 courses. The student's advisor should approve every course taken for graduate credit toward this degree.

Graduate courses taken from the School of Engineering and Computer Science should be selected from the following:

- Mechanical Engineering - credit bearing Mechanical Engineering courses
- Electrical Engineering - credit bearing Electrical Engineering courses
- Computer Science - credit bearing Computer Science courses of which at least 1 of 2 or 3, 2 of 4 or 5, or 3 of 6 must come from CSc 572, 583, 560, 561, 562, 564, 583B or MBA 641, 643 and HCM 642. If only 1 Computer Science course is taken, it may be any credit-bearing course.

Graduate courses taken from the School of Management should be selected from those credit bearing courses numbered MBA-510 and above unless otherwise approved. The following courses are also acceptable to meet the 5 business courses MER/EER 600, MER/EER 601, BOE 610, BOE 611, BOE 612, BOE 613, BOE 614, BOE 615.

\*MS Graduate Seminar (Computer Science) and MS Graduate Project (MSEE or MSME) are no-fee, no-credit course listings.

## **Certificate of Advanced Study in The Business of Energy**

### **Courses**

#### **Certification Requirements (4 courses):**

The Business of Energy Certificate requires four courses (12 credits). The Fundamentals of the Business of Energy course is required and then students select three additional courses from the courses below. Four courses are required to earn the Certificate, however students will benefit greatly from completing all six courses. Students may enroll in particular courses without earning the Certificate and will need the approval of the Dean to do so.



# SCHOOL OF MANAGEMENT

## Degrees Offered

- Master of Business Administration (MBA)
- Master of Business Administration—Healthcare Management (HC-MBA)
- Master of Science Healthcare Data Analytics

## Certificates Offered

- Certificate in Healthcare Management
- Certificate in Human Resource Management
- Certificate in Management and Leadership

## The MBA Management Program

### Program Requirements (17 Courses + Internship)

#### Preliminary Half Course (non-credit)

MBA 001 Mathematics of Management  
MBA 002 Introduction to Probability  
MBA 003 Microeconomics  
MBA 004 Macroeconomics

#### Required Core Courses (Nine)

All students must complete and/or waive the required courses.

MBA 506 Statistical Models for Management  
MBA 510 Financial Accounting  
MBA 512 Managerial Accounting and Finance  
MBA 517 Advanced Corporate Finance  
MBA 525 Marketing Management and Strategy  
MBA 531 Operations Management  
MBA 545 Business Driven Information Systems  
MBA 551 Managing People and Teams in Organizations  
MBA 571 Ethical Principles of Business (1/2)  
MBA 572 Legal Principles of Business (1/2)

#### Advanced Elective Courses (Seven)

Students must choose at least one course in each of the following three areas. Of the courses chosen, at least one must be designated as Analytics (\*) and at least one designated as Global (\*\*).

#### Finance/Accounting and Economics

MBA 610\*\* Fraud and Forensic Accounting  
MBA 611 Personal Financial Planning  
MBA 612\* Advanced Management Accounting

MBA 613	Advanced Auditing and Research
MBA 618	Mergers, Acquisitions, and Corporate Restructuring
MBA 619	Investments
MBA 620	Investment Management
MBA 624	Sports Economics
MBA 629	Money, Markets and Banking
MBA 661**	International Finance

### **Marketing and Operations**

MBA 606	Advanced Statistics and Data Visualization
MBA 607	Data Architecture
MBA 625	Marketing Communications
MBA 626*	Marketing Research Techniques
MBA 627	Marketing High Tech Products
MBA 628	Consumer Behavior
MBA 632*	Quality Systems Management
MBA 633*	The Role of Statistics in Business and Industry
MBA 640**	Integrating eSystems Into Global Business
MBA 641*	Business Process Simulation
MBA 643*	Systems Analysis & Design for Managers
MBA 665**	International Marketing Management
MBA 682*	Management Science
HCM 609	Healthcare Customer Relationship Management
HCM 642	Data Analytics and Business Intelligence

### **Management and Human Resources**

MBA 635	Project Management
MBA 650	Competing By Design
MBA 651	Communicating Globally
MBA 652	High Performance Leadership
MBA 653	Organizational Development and Transformation
MBA 654	Labor Relations
MBA 656	Ethics Issues in Management
MBA 658	Women and Management
MBA 660**	Executive Decision Processes in Global Environments
MBA 662**	International Business
MBA 664	Entrepreneurship
MBA 667	Leaders on Leadership
MBA 668**	China Study
MBA 674	Growing an Entrepreneurial Business
MBA 675	Foundations of HR Management
MBA 676	Managing Human Resources
MBA 677**	International Human Resource Management
HCM 601	Swiss Healthcare Delivery System

### **Capstone**

All students are required to take the following capstone course.

MBA 681	Strategic Management and Leadership (Capstone)
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### **Internship MBA 683**

Internship or relevant business experience is required for the degree. An internship is not considered one of the seventeen courses.

## **The MBA-Healthcare Management Program** **Program Requirements (17 Courses + Internship)**

### **Preliminary Half Course**

MBA 001 Mathematics of Management

MBA 002 Introduction to Probability

MBA 003 Microeconomics

MBA 004 Macroeconomics

### **Required Courses (15 Courses)**

#### **Finance**

MBA–HCM Core Courses: MBA 510, 512

MBA–HCM Advanced Required Course: HCM 617

#### **Economics**

MBA–HCM Advanced Courses: HCM 620

#### **Marketing and Operations**

MBA–HCM Core Courses: HCM505, HCM 526

MBA–HCM Advanced Courses: None

#### **Management Science**

MBA–HCM Core Course: MBA 506

MBA–HCM Advanced Required Courses: None

#### **Management**

MBA–HCM Core Courses: HCM 501, HCM 507

MBA–HCM Advanced Required Courses: HCM 650

#### **Health Environment**

MBA–HCM Core Courses: HCM 500

MBA–HCM Advanced Required Courses: HCM 674, 680

#### **Information Technology**

MBA-HCM Core Courses: None

MBA–HCM Advanced Required Courses: HCM648

#### **Capstone**

MBA–HCM Core Courses: None

MBA–HCM Advanced Required Courses: HCM 681

### **Elective Courses (Two)**

HCM 656

HCM 607

HCM 601

Any advanced elective offered in the MBA Program

Please note that HCM 500 is a prerequisite for all advanced courses.

### **Internship HCM 683**

An internship or relevant business experience is required for the degree. An internship is not considered one of the seventeen courses.

## **The MS in Healthcare Data Analytics Program**

### **Program Requirements (12 courses)**

Courses are offered online, with two on-site residency sessions of three days each at the beginning and end of the program.

### **Preliminary Half Course**

MBA 001 Mathematics of Management

MBA 002 Introduction to Probability

### **Required Core Courses**

All students must complete and/or waive the required courses.

HCM 500: Introduction to Healthcare Systems

HCM 507: Healthcare Leadership Proseminar

HCM 510: Healthcare Accounting and Finance

HCM 642: Data Analytics and Business Intelligence

HCM 648: Health Informatics

HCM 681: Strategic Issues for Healthcare Organizations (Capstone)

MBA 506: Statistical Models for Management

MBA 606: Advanced Statistics and Data Visualization

MBA 607: Data Architecture

### **Elective Courses**

Students must complete three elective courses.

HCM 604: Hospital Analytics

HCM 606: Payer Analytics

HCM 607: Healthcare Operations Research

HCM 609: Healthcare Customer Relationship Management

## **MBA in Healthcare Management and MS in Healthcare Data Analytics Dual Degree Program**

## **Program Requirements (23 Courses)**

The MBA in Healthcare Management and MS in Healthcare Data Analytics dual degree program requires 18 core courses and five elective courses.

Healthcare data analytics courses are offered online and healthcare management classes are offered both on-site and online. All students participate in three on-site sessions. Each session is three days long and fulfills one course requirement.

### **Required Core Courses**

HCM 500:	Introduction to Health Systems
HCM 501:	Health Systems Management
HCM 505:	Health Operations Management
MBA 506:	Statistical Models for Management
HCM 507:	Healthcare Leadership Proseminar
MBA 510:	Financial Accounting
MBA 512:	Managerial Accounting and Finance
HCM 526:	Health Systems Marketing
MBA 606:	Advanced Statistics and Data Visualization
MBA 607:	Data Architecture
HCM 617:	Healthcare Finance
HCM 620:	Healthcare Economics
HCM 642:	Data Analytics and Business Intelligence
HCM 648:	Health Informatics
HCM 650:	Structural Dynamics in Healthcare Systems
HCM 674:	Legal Aspects of Healthcare
HCM 680:	Health Policy and Epidemiology
HCM 681:	Strategic Issues of Healthcare Management

### **Elective Courses**

Students take two healthcare management and three healthcare data analytics electives.

#### *Healthcare Management*

Students choose two of the following electives:

HCM 601:	Swiss Healthcare Study Tour
HCM 607*:	Healthcare Operations Research
HCM 656:	Group Practice Administration

#### *Healthcare Data Analytics*

Students choose three of the following electives:

HCM 604:	Hospital Analytics
HCM 606:	Payer Analytics
HCM 607*:	Healthcare Operations Research
HCM 609:	Healthcare Customer Relationship Management

\*Cannot be used for both – only meets 1 program requirement

## **Joint Degree and Other Programs**

### **Accelerated BA or BS at Union College and MBA Program**

Union College students considering entrance into the accelerated Bachelor's/MBA program should consult with an MBA program advisor and apply for admission during the sophomore, junior, or first term of the senior year. Joint degree students must complete seventeen graduate courses, three of which may, with undergraduate advisor approval, count toward Bachelor's degree requirements. Graduate courses may not be taken until the junior year and are typically completed during the senior and fifth years. Students may choose either the MBA or the MBA in Healthcare Management degree. There is a limit of five undergrads in each graduate level course.

### **Four-Year JD/MBA Program (with Albany Law School)**

This program is designed to meet the management development needs of students enrolled at Albany Law School. Students spend their first year in law studies, their second year in management studies, and their third and fourth years in law and management studies. Four designated law courses transfer into the MBA degree. Students are required to complete their MBA the winter term of the year they petition to graduate at ALS. Students may choose either the MBA or the MBA in Healthcare Management degree.

### **Joint PharmD /MBA in Healthcare Management (with Albany College of Pharmacy and Health Sciences)**

The MBA in Healthcare Management degree is a 17 course program. The PharmD/MBA joint program reduces the number of required MBA courses to 14. Up to three required courses from the MBA curriculum are waived based on courses taken in the PharmD program at ACPHS. Several MBA preliminary half courses are also met through the PharmD curriculum. In addition, PharmD students meet the MBA Internship Requirement with the selected practicum experiences which are part of the 6th year curriculum at ACPHS. Most joint program students complete the MBA course requirements on a part-time basis over a three year period (years 4-6 at ACPHS).

### **Joint BS Pharmaceutical Science /MBA in Healthcare Management (with Albany College of Pharmacy and Health Sciences)**

The MBA in Healthcare Management degree is a 17 course program. The BS/MBA in Healthcare Management joint program reduces the number of MBA courses needed from 17 to 14. Up to three required courses and three preliminary courses half courses from the MBA curriculum are waived based on courses taken in the BS program at ACPHS. The remaining courses are usually completed on a full-time basis the year following graduation from ACPHS. In addition to coursework, all MBA students are required to complete an administrative internship.

## **Leadership in Medicine (LIM) / MBA in Healthcare Management**

Students in the eight-year LIM program jointly offered by Union College, Albany Medical College and Clarkson University may earn an MBA in Healthcare Management from Clarkson University. Students choosing this option take additional courses while fulfilling all other requirements of the program. The MBA/H degree consists of eight additional courses; five are taken at Clarkson University during the four years of undergraduate study to complete the degree requirements. There is an additional charge for the LIM MBA degree. Students pay for the five additional courses they take at Clarkson University at the graduate tuition rate in effect in the student's spring term of senior year of undergraduate study and the summer after their senior year.

For more information on the Leadership in Medicine Program, and the LIM MBA in Healthcare Management see the entry under the Center for Bioethics and Clinical Leadership.

### **MBA in Healthcare Management (LIM)**

The LIM MBA in Healthcare Management requires 17 courses plus an internship as listed below:

#### **Program Requirements:**

- MBA 506 Statistical Models of Management
- MBA 510 Financial Accounting
- MBA 512 Managerial Accounting and Finance
- HCM 501 Health Systems Management
- HCM 505 Health Operations Management
- HCM 526 Health Systems Marketing
- HCM 617 Healthcare Finance
- HCM 648 Health Informatics
- HCM 656 Group Practice Management
- HCM 674 Legal Aspects of Healthcare
- HCM 680 Health Policy and Managerial Epidemiology
- LIM 500 Introduction to Health Systems
- LIM 503 Healthcare Leadership
- LIM 544 Health and Human Values I
- LIM 553\* Economics of Health (\*or HCM 620, Health Economics)
- HCM 684 Strategic Issues for Healthcare Organizations (Capstone)
- Elective An MBA elective (described in School of Management Section)

An approved internship is required for the MBA in Healthcare Management. If taken as the MBA elective, LIM 571 fulfills the internship requirement. More information on this can be found in the School of Management section of this catalog.

#### **Additional Cost**

Students who elect to take the additional courses to achieve an MBA will be charged additional tuition by Clarkson University

3 course tuitions- Spring of Senior Year

2 course tuitions- Summer following Senior year

## **Dual Clarkson University MBA in Healthcare Management and Albany Medical College MD in Medicine**

The Clarkson MBA in Healthcare Management/Albany Medical College MD is designed to provide students with a business understanding specific to healthcare and move them on to their medical education quickly. While many other medical schools offer a generic MBA, the Clarkson MBA in Healthcare Management is focused on the healthcare environment. Students study alongside others with a passion for healthcare, and learn how to manage a medical practice, deliver quality care in a cost-containment environment, market a practice, and lead other healthcare professionals.

Dual degree students are first admitted to Albany Medical College and then apply separately to Clarkson University. Once admitted to both institutions, they defer the start of medical school by one year and spend about a year at Clarkson University working on MBA courses. The second through fifth years are spent completing the MD degree requirements at Albany Medical College.

The combined programs allow students to “double count” courses which reduces the total time and cost associated with completing the two degrees separately. Five courses taken at Albany Medical College are transferred back to Clarkson University to meet MBA requirements. The combined degree is typically completed in five years.

It is possible to join the Dual degree program after the start of medical school. Students would leave medical school at the end of their third year and spend 13 months at Clarkson University completing MBA course requirements. They return to medical school for their final year.

## **Certificates of Advanced Study Program Requirements (6 courses)**

### **Certificate in Healthcare Management**

#### **Required Courses:**

Introduction to Health Systems	HCM 500
Health Systems Management	HCM 501

#### **Specialty Courses (four):**

Health Operations Management	HCM 505
Proseminar in Healthcare Leadership	HCM 507
Health Systems Marketing	HCM 526
Healthcare Finance	HCM 617
Health Economics	HCM 620
Health Informatics	HCM 648
Structural Dynamics in Healthcare Systems	HCM 650
Group Practice Administration	HCM 656
Legal Aspects of Healthcare	HCM 674



Health Policy & Managerial Epidemiology	HCM 680
Statistical Models for Management	MBA 506
Financial Accounting	MBA 510
Managerial Accounting	MBA 512
Foundations of HR Management	MBA 675

### **Certificate in Human Resource Management**

#### **Required Courses:**

Managing People and Teams in Organizations	MBA 551
Foundations of Human Resource Management	MBA 675
Managing Human Resources	MGA 676

#### **Specialty Courses (three):**

International Human Resource Management	MBA 677
High Performance Leadership	MBA 652
Organizational Development and Transformation	MBA 653
Women and Management	MBA 658
Labor Relations	MBA 654
Competing by Design	MBA 650
Executive Decision Processes in Global Environments	MBA 660
MBA Elective	

### **Certificate in Management and Leadership**

#### **Required Courses:**

Managing People and Teams in Organizations	MBA 551
High Performance Leadership	MBA 652

#### **Specialty Courses (four):**

Financial Accounting	MBA 510
Managerial Accounting	MBA 512
Executive Decision Processes in Global Environments	MBA 660
Organizational Development and Transformation	MBA 653
Leaders on Leadership	MBA 667
Women and Management	MBA 658
Managing Human Resources	MBA 676
MBA Elective	

# CENTER FOR BIOETHICS AND CLINICAL LEADERSHIP

## Degrees Offered

- Master of Science in Bioethics: Clinical Ethics, Research Ethics or Bioethics Policy
- Master of Science Clinical Leadership in Healthcare Management

## Certificate Offered

- Certificate in Bioethics: Specialization in Health Policy & Law, Specialization in Clinical Ethics, and Specialization in Research Ethics

## Center for Bioethics and Clinical Leadership

### Dual & Joint Degree Agreements

Albany Law School  
SUNY Albany School of Social Welfare  
SUNY Albany School of Public Health  
SUNY Albany Philosophy Department (PhD)  
Icahn School of Medicine at Mount Sinai

**Note:** For Union College undergraduate students, no more than three Clarkson courses may be double count for both graduate and undergraduate degrees.

## DEGREES

### Master of Science in Bioethics

#### Program Requirements (12 courses)

#### Master of Science in Bioethics: Specialization in Clinical Ethics (MSB: Clinical)

##### Required courses (12 courses):

BIE 500:	Proseminar in Health & Human Values (on-site)
BIE 510:	Biomedical Ethics
BIE 520:	Healthcare Policy
BIE 530:	Bioethics and the Law
BIE 590:	Clinical Ethics
BIE 610C:	Online Clinical Practicum: Clinical
BIE 620C:	On-Site Clinical Practicum: Clinical
BIE 630:	Master's Project I
BIE 640:	Master's Project II

BIE 650: Capstone Practicum (on-site)

**Students also take two elective course equivalents:**

BIE 525 Public Health Ethics  
BIE 533 Neuro Ethics (1/2 course)  
BIE 543 Jewish Bioethics (1/2 course)  
BIE 545 Reproductive Ethics  
BIE 555 Research Ethics  
BIE 563 Pediatric Ethics (1/2 course)  
BIE 566 Foundations of Empirical Bioethics (1/2 course)  
BIE 567 Survey Research Methods (1/2 course)  
BIE 568 Empirical Methods in Healthcare Policy (1/2 course)  
BIE 569 Statistical Methods in Healthcare (1/2 course)  
BIE 573 Interpersonal Skills and Communication (1/2 course)  
BIE 575 Bioethical Issues at the End of Life

**Optional Residency:**

BIE 622: Optional On-Site Residency (1/2 tuition – no credit)

**Master of Science in Bioethics: Specialization in Research Ethics (MSB: Research)**

**Required courses (12 courses):**

BIE 500: Proseminar in Health & Human Values (on-site)  
BIE 510: Biomedical Ethics  
BIE 520: Healthcare Policy  
BIE 530: Bioethics and the Law  
BIE 555: Research Ethics I  
BIE 580: Research Ethics II  
BIE 610R: On-Line Practicum in Research Ethics  
BIE 620R: On-Site Practicum in Research Ethics  
BIE 630: Master's Project I  
BIE 640: Master's Project II  
BIE 650: Capstone Practicum (on-site)

**Students also take one elective course equivalent:**

BIE 525 Public Health Ethics  
BIE 533 Neuro Ethics (1/2 course)  
BIE 543 Jewish Bioethics (1/2 course)  
BIE 545 Reproductive Ethics  
BIE 555 Research Ethics  
BIE 563 Pediatric Ethics (1/2 course)  
BIE 566 Foundations of Empirical Bioethics (1/2 course)  
BIE 567 Survey Research Methods (1/2 course)  
BIE 568 Empirical Methods in Healthcare Policy (1/2 course)  
BIE 569 Statistical Methods in Healthcare (1/2 course)  
BIE 573 Interpersonal Skills and Communication (1/2 course)  
BIE 575 Bioethical Issues at the End of Life  
BIE 590 Clinical Ethics

## **Master of Science in Bioethics: Specialization in Bioethics Policy (MSB: Policy)**

### **Required courses (12 courses):**

- BIE 500 Proseminar in Health & Human Values (onsite)
- BIE 510 Biomedical Ethics
- BIE 520 Healthcare Policy
- BIE 530 Bioethics & the Law
- BIE 570 Bioethics Policy: Philosophical, Economic and Psychological Foundations
- BIE 525 Public Health Ethics
- BIE 610P Online Practicum
- BIE 535 Medicine & Social Justice
- BIE 630 Masters Project I
- BIE 640 Masters Project II
- BIE 650 Capstone in Bioethics Policy (onsite)

### **Students also take one elective course equivalent:**

- BIE 533 Neuro Ethics (1/2 course)
- BIE 543 Jewish Bioethics (1/2 course)
- BIE 545 Reproductive Ethics
- BIE 555 Research Ethics
- BIE 563 Pediatric Ethics (1/2 course)
- BIE 566 Foundations of Empirical Bioethics (1/2 course)
- BIE 567 Survey Research Methods (1/2 course)
- BIE 568 Empirical Methods in Healthcare Policy (1/2 course)
- BIE 569 Statistical Methods in Healthcare (1/2 course)
- BIE 573 Interpersonal Skills and Communication (1/2 course)
- BIE 575 Bioethical Issues at the End of Life
- BIE 590 Clinical Ethics

### **Dual & Joint degree Agreements**

You apply to each school independent of the Bioethics Program. Admission into one does not guarantee admittance to the other.

### **Albany Law School (JD)**

We offer Concentrations in Clinical Ethics or Research Ethics

Students can complete both degrees in three to four years - The Bioethics Program MS in Bioethics degree is worth 12 credits towards a JD degree at Albany Law School. The Health Law concentration at the Law school earns you 3 courses towards our MSBE Degree

### **SUNY Albany School of Social Welfare (MSW)**

Students in the dual degree program take a combination of online and on-site courses in social work and bioethics to complete a Master's in Bioethics and a Master's in Social Work.

MSW course: SSW 660 Introductory Research Methodology (3 credits) Counts toward the Bioethics Degree

Bioethics Courses: BIE 520 Healthcare Policy, BIE 510 Biomedical Ethics, BIE 530 Bioethics and the Law – Count towards the MSW degree

### **SUNY Albany School of Public Health (MPH)**

Students in the dual degree program take a combination of online and on-site courses in public health and bioethics. Upon successful completion, students are eligible to obtain a master's in bioethics (MSB) and a master's in Public Health (MPH.)

There are many specializations in the MPH courses- you need to check with your advisor about course requirements and waivers. The two degrees can be completed simultaneously.

### **SUNY Albany Philosophy Department (PhD)**

We offer a dual masters and doctoral program in Philosophy and Bioethics, in which each program recognizes course credits in the other program as counting towards completion of their degree. The Doctorate in Philosophy requires 60 credits of philosophy, including up to 8 credits in a cognate field. The MS in bioethics program requires 40 credits, including a thesis project and two elective courses. The total number of credit hours normally required to complete both programs is 100. The approved dual degree program requires 82 credit hours: 52 credits in the PhD in Philosophy program and 30 credits in the Master of Science in Bioethics. Eighteen credits count towards both degrees: Eight credits from the master's program count towards the doctoral degree and ten credits from the doctoral program count towards the master's degree. The students will attend the Albany campus for Philosophy work. Bioethics courses will be primarily online or on-site at the Icahn School of Medicine at Mount Sinai campus and Clarkson University Capital Region Campus.

### **MS Degrees in Clinical Leadership**

The Masters in Clinical Leadership degrees are designed for future physicians, clinicians, pharmacists, and other healthcare professionals who wish to better understand the healthcare industry and the environment in which it exists, or who aspire to clinically-related leadership roles. The goal of the program is to broaden the horizons of students by providing them with knowledge and skills in bioethics, health policy and health management as well as in the health sciences. Degrees are designed for three populations of students:

1. 8-year Leadership in Medicine students (BS/MS/MD Union/Clarkson University/Albany Medical College);
2. Students who are concurrently completing BS or PharmD degrees at the Albany College of Pharmacy and Health Science;
3. Students in neither of the previous programs who are considering medical or administrative healthcare careers.

### **The Leadership in Medicine Program**

The Leadership in Medicine program is an eight-year program jointly offered by Albany Medical College, Clarkson University, and Union College. The objective of this program is to prepare students for the challenge of medical leadership by combining an enriched undergraduate curriculum with graduate education in bioethics, health management, and medicine.

Upon completion of the program, students will receive:

1. a BS from Union College;
2. an MS in Healthcare Management **OR** an MBA in Healthcare Management from Union Graduate College; and,
3. an MD from Albany Medical College.

The application process is administered by the Admissions Office of Union College.

### **Additional Cost**

Students who elect to take the additional courses to achieve an MBA will be charged additional tuition by Clarkson University

3 course tuitions- Spring of Senior Year

2 course tuitions- Summer following Senior year

- The MS Leadership in Medicine-Health Management is outlined below as one of Clarkson's MS Degrees in Clinical Leadership.
- The LIM MBA in Healthcare Management is outlined in the School of Management section of the catalog.

## **MS in Healthcare Management (Leadership in Medicine)**

### **Program Requirements**

The MS in Healthcare Management (LIM) requires 12 courses as listed below:

- MBA 510 Financial Accounting
- MBA 512 Managerial Accounting and Finance
- HCM 617 Healthcare Finance
- HCM 505 Health Operations Management
- HCM 656 Group Practice Management
- HCM 674 Legal Aspects of Healthcare
- HCM 684 Strategic Issues for Healthcare Organizations (Capstone)
- LIM 500 Introduction to Health Systems
- LIM 503 Healthcare Leadership
- LIM 544 Health and Human Values I
- LIM 553 Economics of Health
- LIM 571 Clinical Leadership Practicum

## **MS Clinical Leadership in Healthcare Management (ACPHS BS)**

### **Program Requirements**

There are 12 required courses in the program. Students in the Pharmacy BS/MS Clinical Leadership in Health Management Program automatically waive three of these courses

(HCM 620, HCM 656, and STA 501), utilizing approved ACPHS courses with a B- or better. In addition, select Clarkson coursework may count for ACPHS electives. See program agreement or contact the Admissions office at 518-388-6148 for specifics.

Courses are listed below:

- HCM 500 Introduction to Health Systems
- HCM 501 Health Systems Management
- LIM 553 Economics of Health
- BIE 510 Biomedical Ethics
- HCM 571 Clinical Leadership Practicum
- MBA 510 Financial Accounting
- MBA 512 Managerial Accounting and Finance
- HCM 617 Healthcare Finance
- HCM 674 Legal Aspects of Healthcare
- HCM 680 Health Policy and Managerial Epidemiology
- HCM 656 Group Practice Management
- STA 501 Intro to Probability and Statistics or an approved Statistics course

## **MS Clinical Leadership in Health Management (ACPHS PharmD)**

**(with Albany College of Pharmacy and Health Science)**

### **Program Requirements**

There are 12 required courses in the program. Students in the Pharmacy Doctorate/MS Clinical Leadership in Health Management Program automatically waive three of these courses (HCM 620, HCM 656, and STA 501), utilizing approved ACPHS courses with a B- or better. In addition, Clarkson coursework may count for ACPHS electives. See program agreement or contact the Admissions office at 518-631-9831 for specifics.

Courses are listed below:

- HCM 500 Introduction to Health Systems
- HCM 501 Health Systems Management
- HCM 620 Health Economics
- HCM 571 Clinical Leadership Practicum
- BIE 510 Biomedical Ethics
- MBA 510 Financial Accounting
- MBA 512 Managerial Accounting and Finance
- HCM 617 Healthcare Finance
- HCM 674 Legal Aspects of Healthcare
- HCM 680 Health Policy and Managerial Epidemiology
- HCM 656 Group Practice Management
- STA 501 Intro to Probability and Statistics or an approved Statistics course

# **MS Clinical Leadership in Healthcare Management**

## **Program Requirements**

There are 12 required courses:

LIM 502	Introduction to Health Systems
HCM 501	Health Systems Management
LIM 553	Economics of Health
BIE 510	Biomedical Ethics
LIM571	Clinical Leadership Practicum
MBA 510	Financial Accounting
MBA 512	Managerial Accounting and Finance
HCM 617	Healthcare Finance
LIM 674	Legal Aspects of Healthcare
LIM 670	Health Policy and Managerial Epidemiology
STA 501	Intro to Probability and Statistics
Elective	an approved elective

## **Certificate Programs**

### **Program Requirements**

Each certificate program requires four courses.

#### Specialization in Health Policy & Law

- BIE 520 Healthcare Policy
- BIE 510 Biomedical Ethics
- BIE 530 Bioethics & the Law

Plus one elective:

- BIE 500 Proseminar in Health & Human Values (on-site)
- BIE 545 Reproductive Ethics
- BIE 555 Research Ethics
- BIE 590 Clinical Ethics (as an elective)

#### Specialization in Clinical Ethics

- BIE 530 Bioethics of the Law
- BIE 590 Clinical Ethics (online)
- BIE 610C Online Practicum
- BIE 620C On-site Practicum + day one of Capstone

#### Specialization in Research Ethics

- BIE 555 Research Ethics I (online)
- BIE 580 Research Ethics II (online)
- BIE 610R Online Practicum
- BIE 620R On-site Practicum + day one of Capstone



# COURSES OF INSTRUCTION

If “prerequisites” have not been fulfilled, then written permission forms, signed by the instructor or Dean, must accompany the registration form.

Additional prerequisite requirements may be found within each school/program section.

## SCHOOL OF EDUCATION COURSES

The following courses are for students in the MAT or MST programs. Enrollment in these courses is by permission of School of Education Dean only.

Specific 2015-2016 course offerings are available below. The most recent listing is available online at [http://www.clarkson.edu/sas/classes\\_schedules/index.html](http://www.clarkson.edu/sas/classes_schedules/index.html) or by contacting the School of Education.

To ensure that students meet appropriate prerequisites for all courses, all graduate students are required to have a plan of study on file that has been approved by School of Education advisors.

### **PSY 246. Educational Psychology (Pre-1)**

*Spring; Raso*

Principles of psychology applied to teaching, with emphasis on cognitive abilities of students, classroom management procedures, and motivational techniques.

Prerequisite: PSY 010

### **EDS 500E. Field Observations**

*Fall, Winter, Spring; Snyder (No fee)*

Candidates will observe secondary school instruction and teachers for 12.5 hours (two full days) in grades 7-9 and 12.5 hours (two full days) in grades 10-12, for a total of 25 hours. It is recommended that the candidate observe classes and teaching in the discipline he/she plans to teach. At least one of the observations must take place in a high needs setting. After the observations, candidates will complete an essay response and will be rated by the host teacher with whom they work. EDS 500 E can be undertaken once the admissions process has been started, a transcript provided and the interview completed. It must be completed prior to the intensive summer experience. This fulfills part of the NYS requirement for pre-service hours.

### **Field Experience Requirement**

The School of Education will coordinate field experiences for candidates who require assistance.

This part of the field experience requirement may be met as a part of an undergraduate education course or through sufficient substitute teaching, if approved by the Dean of the School of Education, and with documentation. Observations done as a part of CHN 551 also fulfill this requirement.

**EDS 500F. NYS Practicum**

Candidates will observe 75 hours (12 full school days) of secondary school instruction with teachers in the discipline for which certification is sought, during the internship year. Students will enroll in EDS 500 F at the outset of the full-year placement during the August registration period. EDS 500 F will commence with the start of the internship school's academic year. This experience will include 15 hours of observation and/or teaching students with disabilities, and 15 hours of observation and/or teaching English language learners. This may be done in the internship classes or by observing students in another setting.

Half of the 75 hours will be done in grades 10-12, and half in grades 7-9. Some of the grade 7-9 hours may be completed as a part of the alternate experience. This fulfills the second part of the NYS requirement for pre-service hours.

**Observations**

The majority of these hours will be with the mentor teacher. However, the candidate may also observe other professionals if it is agreed upon by the mentor and meets the UGC field experience guidelines.

**EDS 500G. NYS Requirements**

*Spring; Raso (online)*

This course provides the NYS requirements for teacher certification. This course covers the prevention and intervention of school violence, child abuse identification and reporting, prevention of child abduction, drug, alcohol and tobacco abuse prevention and dignity for all students.

**EDS 511. Curriculum and Methods of Teaching English**

*Summer; Bell*

Curricular planning and instruction for the teaching of English at the secondary school level. The course will include an analysis of secondary language arts curricula including New York State Frameworks for language arts, the common core state standards, instructional techniques and strategies, designing and locating instructional materials, planning, implementing, and evaluating lessons and units. This course is required for MAT English candidates.

**EDS 512. Curriculum and Methods in Teaching Mathematics**

*Summer; Gandrow, Rosenburg*

Curricular planning and instruction for the teaching of mathematics at the secondary school level. The course will include an analysis of classic and current secondary mathematics curricula including New York State Frameworks for mathematics, the common core state standards, instructional techniques and strategies, designing and locating instructional materials, planning, implementing, and evaluating lessons and units. This course is required for MAT Mathematics candidates.

**EDS 513. Curriculum and Methods in Teaching Languages**

*Summer; Gregory*

Curricular planning and instruction for the teaching of second languages at the secondary school level. The course will include an analysis of secondary language curricula including New York State Frameworks for languages; instructional techniques; the

teaching of speaking, listening, reading, and writing; designing and locating instructional materials; planning, implementing, and evaluating lessons and units. This course is required for MAT languages candidates.

### **EDS 514. Curriculum and Methods in Teaching Sciences**

*Summer; Shiland*

Curricular planning and instruction for the teaching of science at the secondary school level. The course will include an analysis of secondary science curricula including New York State Frameworks for sciences; instructional techniques and strategies for teaching scientific concepts; laboratory methods and safety, designing and locating instructional materials; planning, implementing, and evaluating lessons and units. This course is required for MAT sciences candidates.

### **EDS 515. Curriculum and Methods in Teaching Social Studies**

*Summer; Reynolds*

Curricular planning and instruction for the teaching of social studies at the secondary school level. The course will include an analysis of secondary social studies curricula including the New York State Frameworks for social studies; models and techniques for teaching and integrating the various social sciences; designing and locating instructional materials; planning, implementing, and evaluating lessons and units. This course is required for MAT social studies candidates.

### **EDS 540. Psychology of Teaching**

*Summer; Snyder, Lasselle*

Theories of learning and memory applied to instruction; models and research on teaching in secondary schools. Includes thematic analysis of relevant teaching topics such as special needs, differentiated instruction, literacy, second language learners and service learning. This course will include a laboratory component with micro-teaching experiences and will be taken in the summer preceding the teaching internship. (Co-requisite: EDS 240 Lab) This course is required for all MAT candidates.

### **EDS 540L. Microteaching Laboratory**

*Summer; Lasselle, Pirrone*

Students prepare and present several six-30 minute lessons using a variety of instructional models. Models include anticipatory sets, discussion concepts, skills and inquiry with attention paid to themes such as special needs, differentiated instruction, literacy, second language, learners and service learning. Lessons are digitally recorded and critiqued by peer-coaches and laboratory faculty. This laboratory must be taken concurrently with EDS 240 and a course in Curriculum and Methods in Teaching (EDS 511-516). This course is required for all MAT candidates

### **EDS 541. Essential Reading Literacy**

*Summer; O'Connell*

An examination of the reading approaches, both aesthetic and efferent, covers text features, vocabulary building, and strategies for meaning-making to support students' reading in the academic discipline content areas. This course is required for all MAT candidates.

**EDS 544. Literacy for the Content Classroom**

*Winter; Rand*

The theory and instructional approaches that support adolescent students' acquisition of content knowledge through writing. Builds upon the reading essentials of EDS 541 to help teachers use writing processes and varied assignments and strategies for specific content learning objectives, writing to learn as well as display writing, includes instructional planning elements such as types of assignments, writing frequency and pacing, feedback, grading, and reflective analysis of writing products.

**EDS 550A. Special Needs Seminar**

*Fall online; O'Connell*

This seminar is required of MAT candidates and is taken concurrently with the internship. This course explores major aspects of special needs populations in schools, including students with disabilities, gifted and talented students, English Language learners, and students from poverty and minority backgrounds. In addition to legal requirements, this course includes projects to increase teachers' competence in working with special needs populations.

**EDS 550B. Seminar on Assessment and Evaluation**

*Winter; Snyder, Rivera*

This seminar is required of all MAT candidates and is to be taken concurrently with their internship. Topics include: application of instructional theory and research, reflective teaching and self-evaluation, traditional and alternate/performance assessments. Each student will produce a professional portfolio and a teaching video-tape in this course. Only students engaged in an internship may enroll in this course.

**EDS 550C. Seminar on School Reform**

*Spring; Rivera*

This seminar is required of all MAT candidates and is to be taken concurrently with their internship. Topics include: application of instructional theory and research, reflective teaching and self-evaluation, exposure to major school reform movements/proposals such as Value added and Growth Models, Service Learning, Charter Schools and the relationship of new teachers to the reform movement. Only students engaged in an internship may enroll in this course.

**EDS 551, 552, 553. Teaching Internship**

*Fall, Winter, Spring; Snyder*

Graduate interns teach a minimum of two courses in a local secondary school under the direction of an experienced school mentor and a college supervisor. Students meet several times a trimester on campus in addition to their teaching responsibilities. Only matriculated MAT students may be enrolled in an internship.

**EDS 570. Middle School: Students, Structures, and Standards**

*Summer; Reynolds (\$1,100)*

This course is designed to prepare students to teach 5<sup>th</sup> and 6<sup>th</sup> grade students effectively. Students will explore topics and teaching/learning methodology that are most appropriate for teaching students at the middle adolescence level, including team-teaching. Based on

the theoretical and the practical, this course is designed to prepare teaching professionals to be competent, energetic, dedicated, and collegial practitioners at the middle adolescence level.

### **EDS 571. Middle Adolescence Literacy**

*Summer; Morley (\$1,100)*

This course is designed to prepare students to teach and develop literacy skills across the curriculum in grades 5 and 6. Students will review the latest research on the nature and development of reading writing, listening, speaking, viewing, and thinking as it applies to middle adolescence learners. Based on theoretical and practical aspects of teaching, it includes ways to support struggling readers in becoming strategic readers in all content areas. The overall goals of the course are to have teachers understand the effective elements of reading, writing, and expanded literacy instruction across the curriculum no matter what their area of content specialty.

### **580. MAT/MST for Teachers Project**

*Fall; Lasselle*

Individual and group projects relating to the classroom teaching of a particular discipline. Typical projects are: systematic applications of an instructional model of a major segment of curriculum in a teaching subject area; classroom action research; addressing curricular or instructional questions/issues within one's teaching subject area.

### **EDS 590. Independent Study in Education**

### **598. 599. Research and Thesis in the Discipline**

*(Not offered 2015-2016)*

### **EDS 610. Reflective Teaching Practices**

*(Not offered 2015-2016)*

Designed to teach participants how to become reflective practitioners of their own teaching. Participants will be immersed in an extended exercise in evaluating their own professional practice with the goal of improving student learning. (Not open to MAT/MST students.)

### **EDS 611. Learning to Teach to the Highest Standards**

*(Not offered 2015-2016)*

A continuation of the work students have completed in EDS 610. Students will continue their focus on reflective teaching by analyzing specific teaching episodes within the context of their own teaching. (Not open to MAT/MST students.)

### **EDS 621. Mentoring I: Mentoring Interns and Novice Teachers**

*(Not offered 2015-2016)*

Designed for teachers who are thinking about or may have already mentored student teachers, interns, and/or novice teachers. Key questions will be analyzed and assessed in this course including the progressive needs of new teachers; practices that enhance a new teacher's induction into school, school culture, and a profession; effective feedback methods and similar topics are emphasized. (Not open to MAT/MST students.)

**EDS 622. Mentoring II: Advanced Mentoring**

*(Not offered 2015-2016)*

Designed for teachers who have mentored student teachers, interns, and/or colleagues who are looking for a broader perspective on the topic. There are numerous skills introduced designed to ensure that a mentor has more professional skills to offer/share with new teachers and student teachers/interns. (Not open to MAT/MST students.)

**EDS 623. Directing a Mentoring Program**

*(Not offered 2015-2016)*

Designed for teachers who have mentored student teachers, interns, and/or colleagues and are looking for a broader perspective in the field. They may be interested in directing or establishing a mentoring program. (Not open to MAT/MST students.)

**EDS 624. School Law**

*(Not offered 2015-2016)*

Designed for teachers to learn how schools are regulated and the laws governing them. The course teaches the basic tenants of state and federal education law. Constitutional principles are explored and debated. (Not open to MAT/MST students.)

**EDS 625. Teacher Leadership**

*(Not offered 2015-2016)*

The course is the capstone experience of the Certificate of Advanced Study in Mentoring and Teacher Leadership. The goal of this course and the Certificate is to develop teachers into leaders in their classrooms, schools, districts, and beyond their fields of expertise. Prepares teachers with the skills needed to assume leadership roles within their schools and beyond and provides important support and stepping stones toward National Board Certification. (Not open to MAT/MST students.)

**EDS 630. Introduction to Service Learning**

*(Not offered 2015-2016)*

This course will provide students with hands-on knowledge of Service Learning as pedagogy and as a philosophy of learning. Service Learning makes mastering technical, conceptual and theoretical knowledge meaningful and memorable as it fosters young men and women who are prepared to accept real responsibilities and make real life decisions. Students will also consider the benefits of Service Learning to their students, the school and community. They will gain membership in a community of local and national Service Learning teachers who are skilled in utilizing the pedagogy and passionate about its efficacy. (Not open to MAT/MST students.)

**EDS 631. Advanced Service Learning**

*(Not offered 2015-2016)*

Designed for those experienced in Service Learning pedagogy, this course will provide a community of peers to foster the integration of Service Learning into Capital Region classrooms. (Not open to MAT/MST students.)

**EDS 641. Data Driven Instruction**

*Spring; Scott & Saccocio (Hybrid)*

This course is appropriate for teachers and administrators from any discipline and/or grade level. No special mathematical knowledge or background is required. Topics discussed are SLO analysis, test item analysis, measuring the effects of instruction modification, and the affective domain.

### **BIO 553. Plant Biology**

*Spring; Hanchar*

This course will focus on a survey of the land plant kingdom with an emphasis on phylogeny, anatomy, physiology, field identification, and ecology. Emphasis will be placed on the New York State curriculum for biology in secondary schools and ways to link plant study to the curriculum.

### **BIO 556. Biological Demonstrations**

*Winter; TBA*

Focusing on specific biological laboratories taught in middle schools and high schools, this course not only explores the New York State mandated biological laboratories, but also the potential laboratories that can be taught in the discipline at the secondary school level. The emphasis is on the NYS standards-based skills that secondary students need to know and be able to perform. Each student leaves the course with a wide variety of laboratories that can be used in a range of school settings.

### **CHM 561 – Chemistry Demonstrations**

Focusing on specific chemistry laboratories taught in middle and high schools, this course not only explores the New York State mandated chemistry laboratories, but also the potential laboratories that can be taught in the discipline at the secondary school level. The emphasis is on the NYS standards-based skills that secondary students need to be able to perform. Each student leaves the course with a wide variety of laboratories that can be used in a range of school settings.

### **CHN 515. Teaching Chinese in American Schools**

*Fall; Gregory*

Students will become familiar with American public secondary education through reading, discussion, writing, and onsite school observation. A strong emphasis will be on professional writing, reading, and professional communication skills as required by American teachers. Students will be prepared professionally and culturally to enter the public school classroom.

### **CST 570. Computers in the Language Arts Classroom**

*Fall; Mosall*

This course is designed to be a practical application of current technologies to today's typical classroom.

### **CST 571. Computers in the Math & Science Classroom**

*Fall; Mosall*

Special attention is given to emerging technologies currently in use in the secondary curriculum and classroom.

### **EGL 510. Writing and Teaching: A Process Approach**

*(Not offered 2015-2016)*

The purpose of this course is to explore both the rationale for and the methods of teaching writing in secondary schools. In order to learn more about writing, you will choose a research topic relate to your discipline and do in-depth reading and research. You will also have to opportunity to develop writing activities, graphic organizers and assessment tools that will be helpful in your own classroom.

### **EGL 523. American Short Story**

*Fall; TBA*

American Short Story presents an overview of the development of the short story in America from its beginnings in the early 1800s through contemporary exemplars of the genre.

### **EGL 524 - Shakespeare: After 1600**

This course includes close readings of the later plays, including the four great tragedies, as poems and dramas.

### **EGL 531 – Reading Poetry**

Students will examine a broad range of poems in order to examine the sources and characteristics of the unique powers of poetry and poets claimed throughout history. Students will learn to formulate theories of how poetry operates in ways peculiar to itself and to develop personal, aesthetic, and critical approaches to reading poetry effectively.

### **EGL 581. Criticism**

*(Not offered 2015-2016)*

This course focuses on gaining a broad familiarity with the major theoretical approaches to the study of literature and culture. The course will apply the insights gained about theory to the practical act of interpreting literary texts and narratives of various sorts. Strong links will be drawn between theory and practical application.

### **EGL 582. The Civil War Era**

*(Not offered 2015-2016)*

Focusing on the history and literature of the Civil War Era, this course selects materials from 1850-1870. Key concepts and their extensions into the 19th and 20th centuries will be emphasized including race, gender, immigration, industrialism, military tactics, individualism, Romanticism, Realism, Naturalism, and Patriotism. The course will emphasize several interdisciplinary approaches to the study of literature and history, including a wide variety of artifacts that can be used to teach the history and literature of the period. The course will be organized as a seminar emphasizing discussion and student presentations.

### **EGL 585. Nonfiction in the English Classroom**

*Bell*

The Common Core Standards for ELA mandate a shift in the English classroom towards the use of more nonfiction/informational texts. The precise nature of this mandate and its impact on the practices of English teachers continues to be a source of controversy and confusion. In this course, we will come to terms with this controversy, and articulate a



vision for using nonfiction texts in the English classroom. Additionally, we will explore reading and writing in the literary genres that comprise the category of nonfiction, including memoir, the essay, and literary journalism.

**EGL 594. Reading American Theater,**

*Fall; Gaboury*

Theater in Secondary Education will focus on canonical pieces with themes related to and relevant to adolescents. A critical analysis of plays and the writing will be balanced with discussion and assignments on the use of theater as a vehicle for English Language Arts instruction. Common Core Standards as well as the New York State curriculum will be considered.

**ENG 598-599. Independent Study**

(by arrangement)

**HST 510. Comparative History**

*Spring; Sargent*

History 510 takes a comparative and topical approach to the study of traditional global history. The goal is to provide teachers with several different frameworks within which to understand and teach global history. Five main approaches are examined. The course will be organized as a seminar focusing on class discussion rather than lecture. Grading will be based on short papers and a final exam.

**HST 558. The Holocaust**

*(Not offered 2015-2016)*

A formal study of European and American Jewry in the period 1933-1945 focusing on modern anti-Semitism, the Nazi world view, German extermination policies, the response of Europe and the United States, and Jewish behavior in a time of crisis.

**HST 582. The Civil War Era**

*(Not offered 2015-2016)*

Focusing on the history and literature of the Civil War Era, this course selects materials from 1850-1870. Key concepts and their extensions into the 19th and 20th centuries will be emphasized including race, gender, immigration, industrialism, military tactics, individualism, Romanticism, Realism, Naturalism, and Patriotism. The course will emphasize several interdisciplinary approaches to the study of literature and history, including a wide variety of artifacts that can be used to teach the history and literature of the period. The course will be organized as seminar emphasizing discussion and student presentations.

**HST 584. Personality in History**

*(Not offered 2015-2016)*

This course deals with the impact upon history of a number of prominent personalities. The factors influencing their lives, the roles they played in the historical process and the interplay between their personalities and underlying forces of history constitute the subject matter of this course.

**HST 589. Special Topics in Social Science**

*(Not offered 2015-2016)*

This course is designed as a critical thinking course, analyzing the ways in which social scientists write, think, make arguments, and present evidence. The course provides future teachers with multiple ways to evaluate social science evidence in multiple disciplines. The course demands analytical thinking and the ability to articulate orally and in writing.

### **MTH 560 Common Core Math Standards for Teachers**

*Fall; Mattoon*

This course focuses on the Common Core Standards, practices, and educational shifts in mathematics classrooms from P-12. This course not only focuses on the curriculum but the updated models and methods of solving problems. Students will also analyze progression documents to get a more thorough understanding of the Common Core Curriculum throughout a student's educational journey.

### **PHY 590. Physics Demonstrations**

*Fall; Caldarò*

Physics demonstrations are quick experiments that the physics teacher performs, in front of the class, in order to bring to light aspects of the lesson. Reasons for performing a classroom demonstration range from proving a concept, to helping with understanding of the physics, to visualization of an abstract phenomenon, to teaching about experimental physics, to entertainment. The purpose of this course is to help each future teacher to (a) select a collection of about ten experiments, (b) obtain the necessary parts/equipment required to build/create the demo, and (c) learn effective methods of performing the demonstration, both from a pathological and a theatrical perspective. This is an independent-study course that requires a weekly class meeting in addition to several hours per week spent outside the class for building the demos.

### **STEM 530. Analyzing Science /Math Theories**

*Fall; Rivera*

Analyzing Scientific Theories from Philosophical and Historical Perspectives. Students in this course will explore the development of major ideas in the life, Earth, and physical sciences by analyzing the scientific investigations and reasoning employed and how such developments were shaped by their technical, social and cultural contexts. Through such exploration, students will build a deeper and more contemporary understanding of how scientific knowledge is produced and structured and how scientific processes and thinking extend, revise, and reorganize such knowledge.

# SCHOOL OF ENGINEERING AND COMPUTER SCIENCE COURSES

Specific 2015-2016 course offerings are identified by contacting the Associate Dean of Engineering or by going to [http://www.clarkson.edu/sas/classes\\_schedules/index.html](http://www.clarkson.edu/sas/classes_schedules/index.html)

## MS IN COMPUTER SCIENCE COURSES

### Non-Credit-Bearing Courses

#### **CSc 599. Master of Science Graduate Seminar in Computer Science**

(no credit, no fee)

This required, non-credit Seminar provides a capstone experience for graduate Computer Science candidates. Candidates select a topic for independent research during the Fall term. The candidate submits a final written report and presents the research during a seminar session the following Winter or Spring term. Each candidate is required to attend all seminar sessions. The candidate receives a pass/fail grade which appears on the official transcript. This course is normally taken during the final year of the candidate's program. Prerequisite: Approval of graduate advisor.

### Credit-Bearing Courses

#### **CSc 510. Operating Systems**

Batch, interactive, real-time, and distributed operating systems; multiprogramming, multiprocessing, multiplexing, multitasking; concurrent programming; elementary queuing theory; memory management; resource allocation, sharing and protection. This course is cross-listed in the Union College catalog as an undergraduate course (335). Graduate students will be expected to complete additional coursework beyond the undergraduates in this class.

#### **CSc 511. Algorithm Design and Analysis**

Fundamental algorithms used in a variety of applications. Includes algorithms on list processing, string processing, geometric algorithms, and graph algorithms. This course is cross-listed in the Union College catalog as an undergraduate course (250). Graduate students will be expected to complete additional coursework beyond the undergraduates in this class.

#### **CSc 512. Theory of Computing**

A discussion of the fundamental ideas and models underlying computing—properties of formal languages, finite automata, regular expressions, pushdown automata, context-free

languages, Turing machines, and undecidability. This course is cross-listed in the Union College catalog as an undergraduate course (350). Graduate students will be expected to complete additional coursework beyond the undergraduates in this class.

### **CSc 513. Programming Languages**

An introduction to issues in programming language design and implementation. Major programming language paradigms: functional, logic, and object-oriented, and their use. This course is cross-listed in the Union College catalog as an undergraduate course (370). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisites: CSc 511

### **CSc 514. Computer Graphics**

Algorithms for handling two-dimensional and three-dimensional objects. Interactive graphics hardware and systems. X windows, engineering workstations. This course is cross-listed in the Union College catalog as an undergraduate course (385). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisites: Calculus III: Differential Vector Calculus and Matrix Theory

### **CSc 515. Introduction to Databases**

Introduction to data models and database design. Coverage of network, hierarchical, and relational architectures with emphasis on the latter. Study of relational algebra, entity-relationship modeling, and data normalization. Study of fourth generation query languages including SQL. Introduction to centralized, distributed, federated, and mediated systems. This course is cross-listed in the Union College catalog as an undergraduate course (340). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Data Structures

### **CSc 516. Software Engineering**

Strategies for the specification, design, production, testing, and support of computer programs; software development models; programming team structures; documentation and maintenance. This course is cross-listed in the Union College catalog as an undergraduate course (360). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: CSc 511.

### **CSc 518 Digital Design**

*(Cross-listed as EER 518)*

The design of digital hardware systems at the module level using modern approaches. Datapath and control unit design, hardware description languages, minimization, pipeline. Laboratory exercise and a design project are required. This course is cross-listed in the Union College catalog as an undergraduate course (318). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Introduction to Digital Computers or equivalents.

### **CSc 529. Neural Networks**

*(Cross-listed as EER-529)*

Topics include the biological basics of artificial neural networks, neuron models and architectures, back propagation, associative and competitive learning. Weekly computer laboratories and a final project required. This course is cross-listed in the Union College catalog as an undergraduate course (329). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Linear Algebra and Differential Equations.

### **CSc 544. Artificial Intelligence**

Fundamental concepts used in creating “intelligent” computer systems; semantic representation, logical deduction, natural language processing, and game playing; expert systems, knowledge-based systems, and elementary robotics. This course is cross-listed in the Union College Catalog as an undergraduate course (320). Graduate students will be expected to complete additional course work beyond the undergraduates in the class.

Prerequisite: CSc 511.

### **CSc 547. Data Communications and Networks**

*(Cross-listed as EER-547)*

An introduction to protocols, communication hardware, networks, error detection and handling, and software. This course is cross-listed in the Union College catalog as an undergraduate course (337). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Introduction to Digital Computers or Topics in Computer Logic and Mathematics, or equivalents. A knowledge of statistics is helpful.

### **CSc 551. Large Scale Software Development**

Strategies for the systemic design, implementation, and testing of large software systems. Design notations, tools, and techniques. Design patterns and implementation idioms. Implementation, debugging and testing. Includes team and individual software development projects. This course is cross-listed in the Union College catalog as an undergraduate course (260). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisites: Logic & Set Theory.

### **CSc 552. Embedded Microcontroller Systems**

Architecture, Programming, and Applications

*(Cross-listed as EER 552)*

Hardware and architecture with emphasis on 8051 microcontroller; programming in assembly and higher-level languages, microcomputer applications, and interfacing. Design projects required. This course is cross-listed in the Union College catalog as an undergraduate course (352). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisites: Knowledge of computer programming and introduction to Digital Computers or equivalent.

### **CSc 560. Network and Systems Security**

This course explores critical business challenges: how to protect an organization’s computer networks, systems, applications and information. Students learn how to design

procedures, protocols, and policies that address both engineering and human issues. Engineered security is examined through the application of cryptography, digital signatures and certificates, authentication protocol, firewalls, and intrusion detection. Also considered are security issues related to people's use of organization's networks and systems including policies and practices for password management and protecting privacy rights. Students also study options for maintaining business continuity in the event of a disruption of business operations. Specific case studies are used to highlight the choices that must be made to balance operational efficiency of business functions with protecting the business from the onslaught of security threats. Prerequisite expertise: Networking protocols. The student should have taken a course in computer communications/networking and have programming experience such as C/C++, or JAVA or PHP. (The programming experience will allow the course to include hands on security project).

### **CSc 561. Software Quality Management**

This course prepares students to apply a quality mindset to both the development process and the developed software. Students learn the theory and practice of quality assurance and testing computer software. Topics of study include the use of metrics to measure quality, software quality standards as a baseline for establishing and assessing quality, the effects of the economics on product reliability, and software testing practices (including test design, coverage, and tools). Students will study specific cases that highlight practical techniques and reveal the relationship between software quality management and meeting an organization's business objectives.

### **CSc 562. Business Intelligence**

This course offers an interdisciplinary look at computing technologies in support of forming valuable business insights and making effective decisions. Students acquire knowledge of the conceptual basis for data warehousing (collection and organization of data in database management systems) and data mining (detecting of patterns in business data). Students then build the skills to extract business intelligence from collected and analyzed data and present it for use in business decision-making activities. Various practical applications are studied such as customer segmentation, Customer Relationship Management (CRM), Group Decision Support Systems (GDSS), and Executive Information Systems (EIS). Students will learn about trends in the use of business intelligence software and techniques and examine specific case studies. There will be an opportunity for students to develop their own application project. Prerequisite expertise: database management systems.

### **CSc 564. Systems Analysis and Design Methods**

The application of information technology has extended to all quarters of the business world. While the nature and the scope of information systems vary widely depending on the business context, the fundamental knowledge underlying their development remains the same. This course aims to provide technology students with a solid understanding of the important methodologies and tools & techniques related to the development of information systems in a variety of contexts.

### **CSc 570. Enterprise Architecture**

This course provides students with an understanding of the basic concepts and practices of Enterprise Architecture (EA). This is not a course on information systems development, web/application programming, database development, or network design. The course focuses on understanding how information technology resources can best be leveraged to support an organization's strategic goals and business requirements. Basic proficiency is developed in the understanding of several EA methodologies, number of governments and major corporations around the world, as well as the U.S. Federal Government's approach to EA. Students learn the theory and practice of EA through a combination of lectures, student-led class instructions, analysis papers, exams, and a written project with a verbal presentation.

### **CSc 571. System Modeling & Optimization**

(i.e. Computational Intelligence)

*(Cross-listed as EER 571, MER 571)*

Topics include the theory, design, and application of biologically and linguistically motivated computational methods emphasizing neural networks, genetic algorithms, fuzzy logic, and hybrid intelligent systems in which these methods are employed. Special emphasis will be placed on applying these techniques to "real-world" problems, and examples from a broad range of industrial applications will be presented. Homework assignments and a final project are required.

Prerequisites: Undergraduate calculus and linear algebra.

### **CSc 572. Engineering Statistics**

*(Cross-listed as EER 572, MER 572)*

Modern engineering practice makes extensive use of statistical methods for the efficient collection and analysis of engineering data, and to support data-based decision making. This course will introduce the statistical tools that are of greatest importance for practicing engineers. Core topics to be covered will include probability and distribution theory, the construction and interpretation of statistical intervals, statistical hypothesis testing, regression analysis and empirical modeling, statistical experimental design, and statistical quality/process control. Additional specialized topics may also be covered, depending upon the interests of the class; possible topics include system reliability analysis, measurement system analysis, process capability analysis (and "six-sigma"), accelerated life testing, and acceptance sampling.

### **CSc 573. Robotics**

This course will provide an introduction to robotics. The course will cover basic algorithms necessary for motor control. Building on these methods we will discuss higher level navigation for mobile robots, as well as the sensing necessary for localization of the robot in its environment. Finally we will also examine the challenges of motion planning for jointed robots with many degrees of freedom.

### **CSc 583. Selected Topics in Computer Science**

Prerequisite: Permission of the instructor.

### **CSc 583B. Business Data & Communications & Networking**

This course is designed to convey the essentials of data communication networks. It will cover concepts, technologies and architectures. There will be practical lessons built into

the semester's topics and assignments whenever possible. A single course cannot cover all possible networking topics and issues, so we will cover the major conceptual areas balanced with practical discussions and exercises. We will also discuss important network management topics such as domain management and security. Specifically, the following topics will be covered: Fundamentals of Networking Technologies, OSI Model, Physical Layer, Data Link Layer, Local Area Networks, Wireless Local Area Networks, Network/Transport Layers TCP/IP, Backbone Networks, Wide Area Networks, Application Layer, The Internet, Network Design, Network Management and Network Troubleshooting, Network Security, Voice over IP>

**CSc 590-593. Independent Study**

*(by arrangement)*

Prerequisite: At least two CSc courses numbered between 530 and 589.

**CSc 594-595. Two-Term Programming Project**

*(by arrangement)*

Prerequisite: At least two CSc courses numbered between 530 and 589.

**CSc 596-597. Research and Thesis**

*(by arrangement)*

Prerequisite: At least two CSc courses numbered between 530 and 589.

## **MS IN ELECTRICAL ENGINEERING COURSES**

**\*Indicates Energy related course for MS Energy Systems**

### **Non-Credit-Bearing Courses**

**EER 599. Master of Science Graduate Project in Electrical Engineering**

This non-credit seminar project provides a capstone experience for graduate electrical engineering candidates not completing a thesis or independent study. The candidate and faculty advisor agree on project scope and evaluation process. The candidate receives a pass/fail grade which appears on the official transcript. This is a no-fee course.

### **Credit-Bearing Courses**

**EER 518. Digital Design**

*(Cross-listed as CSC 518)*

The design of digital hardware systems at the module level using modern approaches. Datapath and control unit design, hardware description languages, minimization, pipeline. Laboratory exercise and a design project are required. This course is cross-listed in the Union College catalog as an undergraduate course (318). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Introduction to Digital Computers or equivalents.



**\*EER 522. Linear Control Systems**

*(Cross-listed as MER 522)*

This course addresses practical control system design primarily from a classical perspective. Beginning with transfer function modeling of dynamic systems, the course moves through transient, root locus, and frequency response analysis to end with frequency domain techniques for controller design.

**\*EER 528. Digital Control Systems**

The course begins with a brief review of continuous-time control methods before transitioning to the theory and implementation techniques for control of dynamic processes by digital computers. Topics covered include discrete system analysis, sampled data systems, quantization effects, state space representation of digital control systems, and the design of digital control algorithms.

**\*EER 542. Electronic Power Conversion**

This course examines the application of power semiconductor devices to the efficient conversion of electrical energy. Circuit analysis, signal analysis, and energy concepts are integrated to develop steady-state and dynamic models of generic power converters. Specific topics include AC/DC conversion, DC/DC conversion, DC/AC conversion, and AC/AC conversion. These generic converters are applied as controlled rectifiers, switching power supplies, motor drives, HVDC transmission, induction heating, and others. Ancillary circuits needed for the proper operation and control of power semiconductor devices are also discussed.

Prerequisites: Courses in circuit analysis, signals and systems.

**\*EER 542A. Modeling & Control of Energy Conversion**

This course examines modeling and control techniques appropriate for application to power electronic and electric machine systems. The course will involve examination of the appropriate theory, followed by application through examples and small design projects. Simulation will be used to evaluate the merits of various techniques.

Prerequisites: EER 242, Power Electronics I; some exposure to state-space models is desirable.

**\*EER 542B. Electromechanical Energy Conversion**

This course is designed to introduce the student to the inside of AC electric machinery. It begins with a review of computing inductance using the integral form of Maxwell's equations. Next, the energy method for computing the forces of electrical origin is introduced. These forces are then combined with circuit equations and the equations of mechanics to obtain dynamic models of electromechanical systems. The methodology developed is applied to simple electromechanical structures and then to various types of synchronous machines; induction machines are also considered. Consideration will be given to the electronic control of electric machines.

Prerequisite: A undergraduate course in electromagnetics.

**EER 543. Introduction to Antenna Theory**

Propagation of electromagnetic waves, antenna parameters, arrays, wire antennas, aperture antennas, receiving antennas. Prerequisite: Introduction to Electromagnetic

Engineering I or equivalent. This course is cross-listed in the Union College catalog as an undergraduate course (368). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisites: Introduction to Electromagnetic Engineering or equivalent.

### **EER 547. Data Communications and Networks**

*(Cross-listed as CSc 547)*

An introduction to protocols, communication hardware, networks, error detection and handling, and software. This course is cross-listed in the Union College catalog as an undergraduate course (337). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Introduction to Digital Computers or CSc Pre1 (Topics in Computer Logic and Mathematics), or equivalents. A knowledge of statistics is helpful.

### **EER 548. Digital Circuits**

Special circuitry of digital systems; transistors as switches, logic gate types (RTL, DTL, TPL, ECL, MOS, CMOS, etc.), digital ICs semiconductor memories. Design projects required. This course is cross-listed in the Union College catalog as an undergraduate course (348). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Introduction to Digital Computers, Introduction to Semiconductor Devices and Circuits or equivalents, or permission of the instructor.

### **\*EER 551. Superconductivity**

Superconductivity is a complex physical phenomenon still at the forefront of research. This course is designed to provide a fundamental working knowledge of this technology, the importance and integration of material properties and a broad understanding/appreciation of the applications in the areas of power equipment and electronics. The course will also focus on active research and technological barriers for future applications.

### **EER 552. Embedded Microcontroller Systems**

*(Cross-listed as CSc 552)*

Hardware and architecture with emphasis on 8051 Microcontrollers; programming in assembly and higher-level languages, microcomputer applications, and interfacing. Design projects required. This course is cross-listed in the Union College catalog as an undergraduate course (352). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisites: Knowledge of computer programming and Introduction to Digital Computers or equivalent.

### **\*EER 560. Power System Analysis I**

Power and energy in AC circuits. Single-phase, three-phase and polyphase circuits in balanced and unbalanced regimes. Measurement of three-phase power. Determination of three-phase sequence. Single-line diagrams. Per-unit method of representation and computations. Transformers and synchronous machines in power systems. Parameters of transmission lines. This course is cross-listed in the Union College catalog as an

undergraduate course (360). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisite: Electric Circuits or equivalent.

**\*EER 561. Power System Analysis II**

Wave-propagation in transmission lines. Analysis of power networks, load-flow solutions and control. Three-phase faults and symmetrical components. Power system protection. Stability of power systems. This course is cross-listed in the Union College catalog as an undergraduate course (361). Graduate students will be expected to complete additional course work beyond the undergraduates in this class.

Prerequisites: Electric Circuits or equivalent.

**\*EER 570. Nuclear Engineering**

*(cross-listed as MER 560)*

The purpose of this course is provide students of various engineering disciplines a functional knowledge of nuclear engineering principles and those most important to the design of nuclear power generation systems. The course will focus both on the nuclear reactor core as well as plant systems. The intent is that students will gain a physical understanding of nuclear engineering principles as they relate to their own field of interest. Class participation will be highly encouraged and focused through the discussion of current events in the nuclear industry as well as proposed future nuclear technologies

**EER 571. System Modeling & Optimization**

**(i.e. Computational Intelligence)**

*(Cross-listed as CSC 571)*

Topics include the theory, design, and application of biologically and linguistically motivated computational methods emphasizing neural networks, genetic algorithms, fuzzy logic, and hybrid intelligent systems in which these methods are employed. Special emphasis will be placed on applying these techniques to “real-world” problems, and examples from a broad range of industrial applications will be presented. Homework assignments and a final project are required.

Prerequisites: undergraduate calculus and linear algebra.

**EER 572. Engineering Statistics**

*(Cross-listed as CSc 572, MER 572)*

Modern engineering practice makes extensive use of statistical methods for the efficient collection and analysis of engineering data, and to support data-based decision making. This course will introduce the statistical tools that are of greatest importance for practicing engineers. Core topics to be covered will include probability and distribution theory, the construction and interpretation of statistical intervals, statistical hypothesis testing, regression analysis and empirical modeling, statistical experimental design, and statistical quality/process control. Additional specialized topics may also be covered, depending upon the interests of the class; possible topics include system reliability analysis, measurement system analysis, process capability analysis (and “six-sigma”), accelerated life testing, and acceptance sampling.

**EER 573. Case Studies in Failure and Ethics in Engineering**

*(Cross-listed as MER 573)*

This course provides a broad look at engineering failure and ethics in engineering. It will focus on engineering failure case studies and the principles of applied engineering ethics to understand engineering disasters and to learn from these failures and to prepare engineers for the decisions they may face in their professional careers. Focus is on mechanical engineering.

#### **EER 574. Solid State Electronics**

Course reviews the physics and technology of semiconductor electronic devices and their dynamic behavior. Emphasis will be placed on semiconductor devices used in high-power and high frequency applications such as power electronic switching elements and microwave power amplifiers. Course emphasizes physical understanding of device operation and limitations through energy band diagrams, electron carrier statistics and transport, charge control equations, and equivalent circuit models. Derivation of electrical characteristics and dynamic limitations will be presented for (1) power diodes, (2) bipolar devices such as the power bipolar junction transistor and thyristors, (3) unipolar devices such as the microwave field effect devices and (4) new classes of controlled power electronic devices such as the insulated gate bipolar transistor. Issues such as reduction of parasitic electrical losses, high bandgap semiconductor material development, and thermal management will be discussed.

#### **EER 576. Motor Acoustics**

*(Cross-listed as MER 576)*

Development of the fundamental principles and equations for motor noise and vibration. Focus on development of analytical methods for predicting the acoustic performance of motors, along with an overview of numerical methods. Develop an understanding of the key principles and governing equations of motor acoustics. This covers noise generation by the motor, its structural dynamics response, and its sound radiation. Apply those equations to the analytical prediction of the noise sources and acoustic responses of motors. Understand the bounds of applicability of the analytical formulas, and the numerical methods which are available to predict the response of complex motors.

#### **\*EER 580. Fuel Cell Science and Hydrogen Engineering**

*(Cross-listed as MER 580)*

Introduce the student to the science and engineering of fuel cell technology. Emphasis will be on developing an understanding of different types of fuel cells, their applications, and the engineering of complete fuel cell systems. Elements of the class will include: electrochemistry; polymer materials science for proton exchange membrane (PEM) based systems; ceramics for solid oxide fuel cells; liquid-electrolytes for phosphoric acid and alkaline fuel cells; and other methods of generating power directly from a fuel and an oxidant. They system requirements of the fuel cell stack will be introduced to provide a complete picture of the technology. Other elements addressed during the course will include thermochemistry; electrochemistry; fuel processing or reforming; electrical & power management; polymer science and systems engineering. Developing an understanding of the proton exchange membrane fuel cell will be the primary objective. After completing this course, the student is expected to have an understanding of the

technical needs, challenges, and opportunities of fuel cell systems. The overall essence of the class will be to address the essentials of fuel cells and fuel cell systems and related electrochemical systems. Elements of the entrepreneurial aspects of the industry will also be covered. Hydrogen will be discussed throughout the semester as it relates to fuel cells and the emerging changes in power generation models.

Prerequisite: Advisor approval

**\*EER 580A. Photo Voltaic Engineering**

*(Cross-listed as MER 580A)*

The course focuses on the physical principles, technology, and design of efficient semiconductor photovoltaics. Course goals equip students with the concepts and analytical skills to understand efficiency limitations, to assess the viability of various solar and thermophotovoltaic technologies, and to introduce the physics required for understanding photovoltaic energy conversion. The course will focus on three primary aspects of photovoltaic energy conversion, (i) the transfer and conversion of solar (i.e. thermal) radiation to electronic energy, (ii) the theory and design of the semiconductor photovoltaic cell and (iii) photovoltaic systems and applications.

Prerequisites: Advisor approval.

**\*EER 580B. Turbine Engineering**

*(Cross-listed as MER 580B)*

Course on fundamentals of design, analysis, and technology of turbo machinery – jet engines, gas turbines, steam turbines, water turbines, and wind turbines. The course will provide an understanding of all aspects of system development: thermodynamic cycles, design-point and off-design performance; function and design of components (inlets, compressors, combustors, turbines, outlets), operational limits, and environmental concerns; structural analysis, lifting, and materials; rotor dynamics and blade aeromechanics; clearance analysis, sealing, and packing; heat transfer, blade and component cooling; starting and control; power and thrust generation; testing and instrumentation. The student is expected to develop a broad understanding of the state-of-the-art, challenges, and future of turbine systems.

**\*EER 580D. Wind Energy Engineering**

*(Cross-listed as MER 580F)*

The course focuses on “Wind Farm Project Design and Development” (1/2) and “Wind Turbine Technology” (1/2). Part I: Teams will demonstrate understanding of complete wind farm design/development process inclusive of site selection, wind resource evaluating target land area, turbine choice, location, energy projection, cost, transmission. Part 2: Focuses on technical understanding of Wind Turbine attributes such as structural, blade system, Nacelle system, electrical system, performance, and future opportunities.

**\*EER 580E. Solar Energy Engineering**

*(Cross-listed as MER 580E)*

This course is designed to enable the student to effectively grasp the complex and quickly changing solar industry. The course will cover such topics as the economy of solar, photovoltaic devices, systems and applications. In order to cover this broad range of

technical topics, the course will utilize multiple instructors. Each instructor has significant expertise and depth in the given field and the student will be able to draw from their experience. Students completing this course will develop knowledge of the solar industry, looking at the past, present and future of this technology area. Students will gain key technical background in every aspect of the industry and will be able to assess new technologies as they are developed. Understanding of the economics of solar and its future will also be obtained.

**\*EER 580G. Synchronous Electrical Generators**

*(Cross-listed as MER 580G)*

Course on fundamentals of design and analysis of power generators, such as those used in thermal power plants and wind turbines. The course will address the basic operating principles of the synchronous machine and consider configurations such as would field, permanent magnet, and doubly fed generators. Key topics will include understanding and analysis of the magnetics within the machine, losses and efficiency, thermal performance, mechanical behavior, operation on the power system, and key IEEE and IEC standards. Further topics will include the duty imposed on the machine during service as well as the duty it imposes on the turbine. The student is expected to develop a broad functional understanding of the current engineering technology, challenges, and future of generator technology.

**EER 581, 582, 583. Special Topics in Electrical Engineering.**

Topics chosen from the current literature according to faculty and student interest. Possible topics include new developments in the major areas of electrical engineering such as electromagnetic fields, communications, controls, circuits, power, devices, electronics, and computer design. Topics may include but not be limited to image processing, machine vision, speech synthesis, integrated optics, antenna systems, adaptive filtering, variational methods, stochastic processes, optical communications, space and satellite communications, and computer networks. Each of these special topics courses has a variable content addressing specific current areas of interest to students. They will be offered whenever the need and interest arises.

**EER 590-595. Independent Study**

*(by arrangement)*

**EER 596-597. Research and Thesis**

*(by arrangement)*

**Credit-Bearing Non Technical Electives**

**\*EER 600. Disruptive Technology**

*(Cross-listed as MER 600)*

This course is designed to prepare the student to be able to efficiently evaluate potential disruptive technologies and their potential for application/commercialization. The course will cover such topics as the CO2 Mitigation, Solid state Energy Systems, Bio Energy and Fusion that have potential to impact the future. In order to cover this broad range of technical topics, the course will utilize multiple instructors that have technical depths as well as experience in the field.

**\*EER 601. Sustainability**

*(Cross listed as MER 601)*

The focus of this course is to build an understanding of what is meant by Sustainable Energy and to be able to analyze a range of different opportunities. The intent is to perform a value analysis on each opportunity in order to determine which are practical, on a variety of scales, while considering all aspects of the opportunity. Attention will be placed on efficiencies, scale, and impact of each opportunity as well as what limitations may exist.

**\*BOE 610. Fundamentals of The Business of Energy**

An initial umbrella course designed to acquaint the student with the complexities of the present-day power system and how we arrived at this point. It will include a brief history of the industry evolution and will encompass various fuels, types of generation, regulatory authorities, power transmission, distribution, control & dispatch, planning, power markets and revenue flows.

**\*BOE 611. Planning and Operations of Power Systems**

Operations and planning of power systems will introduce and discuss the decision process regarding generation types, fuels and transmission. Comparisons will be introduced establishing the difference between traditional vertically integrated utilities and unbundled resource suppliers. The principles of electric power systems will be studied along with the impact of deregulation.

**\*BOE 612. Power Markets**

This course will deal with the intricacies of the workings of the power markets (including gas). It will introduce and discuss the evolution from regulated pricing to market pricing. It will introduce and discuss market-based products necessary for reliable operation; hedging principles; and out-of-market products necessary for a fair and reliable market.

**\*BOE 613. Deregulation/Restructuring**

This course will explore the history of legislation, regulation and regulatory authorities in the development of the power industry and its impact on the economy and consumers. The evolution of the relationships between regulators and the regulated; the restructuring of the natural gas and electric industry over the last three decades; and the current regulatory status of both the infrastructure and power markets will also be studied.

**\*BOE 614. Electric Power Industry Economics & Finance**

This course will evaluate the weaving thread of economics and finance as an integral part of operations and strategic planning in the complex energy industry. It will investigate supplier economics and finance under regulation and deregulation environments. It will evaluate market transactions, payment paths, settlements, capital requirements, financial instruments, and procedures that are identified with the industry. It will review economic issues confronting power transmission owners/providers under regulated models and merchant function models. The course will identify and encourage a knowledge-based review of new technologies and green energy as they relate to financial and economic decision making. Energy policies, metering technology, micro-grids, government

influences, fuels and storage will all be explored as they relate to various present and future economic and financial models.

**\*BOE 615. Challenges to Upgrading Aging Infrastructure**

This course will examine and evaluate the changing energy horizon as the industry embraces expanding technology, renewable energy, smart grid technology, etc.; to be exercised upon an aging infrastructure. The student will see the critical need for system knowledge and planning to continue to meet the needs and reliability of a sophisticated complex industry struggling to meet the needs of its customers and economic growth.

## **MS IN MECHANICAL ENGINEERING COURSES**

**\*Indicates Energy related course for MS Energy Systems**

### **Non-Credit-Bearing Courses**

**MER 599. Master of Science Graduate Project in Mechanical Engineering**

This non-credit Seminar project provides a capstone experience for graduate mechanical engineering candidates not completing a thesis or independent study (i.e. all course work). The candidate and faculty advisor agree on project scope and evaluation process. The candidate receives a pass/fail grade which appears on the official transcript. This is a no-fee course.

### **Credit-Bearing Courses**

**MER 500. Elasticity**

*Winter; Pollack*

The behavior of substances that possess the property of recovering their size and shape when forces producing deformation are removed. Review of stress and strain; study of two-dimensional problems in rectangular, polar, and curvilinear coordinates; introduction to three-dimensional problems; torsion and bending.

Prerequisites: Calculus IV, Linear Algebra and Differential Equations, and Mechanics of Materials or equivalent

**MER 501. Transport Phenomena**

*Spring; Bessler*

The fundamentals of momentum, energy, and mass transfer and their analogous transport mechanisms. One-dimensional transport, transport properties, transport with internal generation, transfer coefficients, convective and turbulent transport.

Prerequisites: Linear Algebra and Differential Equations, Heat Transfer Analysis and Design or equivalents

**MER 502. Engineering Analysis**

*Fall; Pollack*

Topics in applied mathematics needed to analyze and model engineering problems by constructing mathematical models for a physical situation and the reduction of the



ensuing mathematical problems to numerical procedures. Matrices, linear algebra, vector and tensor calculus, partial differential equations, calculus of variations, finite element and difference techniques, Fourier series and integrals.

Prerequisites: Calculus, Linear Algebra and Differential Equations or equivalents

#### **MER 506. Mechanical Behavior of Materials**

Strain relationships in elastic and plastic behavior. Metallurgical fundamentals of plastic deformation. Dislocation theory. Materials testing. Creep and metal fatigue.

Prerequisites: Calculus, Linear Algebra, Differential Equations, and Mechanics of Materials or equivalents

#### **MER 507. Design for Manufacturing**

This course will introduce the student to the principles of design for manufacturing. The course will begin by examining modern manufacturing operations including machining, casting, forging, welding, brazing, soldering, finishing, heat treating, assembly, plastic materials processing, powder metallurgy, and specialized manufacturing processes. This section will also include electronics manufacturing, covering both through-hole technology and surface mount devices. For each manufacturing process, capabilities and limitations will be discussed and how they relate to part design and cost. Design for manufacturing principles will be examined, including how the designer affects manufacturing cost, lean manufacturing, six sigma, value stream analysis, manufacturing rate, the cost of quality, process flexibility, process simulation, and process economics.

Prerequisites: Strength of Materials, Mechanics or equivalent

#### **MER 508. Fracture Mechanics**

Modern theory of fracture in design. The ability to apply fracture mechanics principles to the design and analysis of engineering structures. Subjects treated include occurrence of fracture, fracture toughness, fracture resistance, and fatigue.

Prerequisites: Mechanics of Materials or equivalent

#### **MER 509. Current Approach to Fatigue in Design**

To provide engineering students with an understanding of fatigue mechanisms, design criteria and realistic examples to avoid and predict fatigue/durability failures in structures and components. The major emphasis of the course is fatigue of metals as applied to a variety of engineering structures and components, including both fatigue mechanisms and design applications. The course material is applicable to ground vehicles, buildings/bridges, aerospace vehicles, ships, nuclear pressure vessels, metal implants/prostheses and others. Both constant amplitude and variable amplitude fatigue life situations are considered.

Prerequisites: Calculus, Differential Equations, Strengths of Materials

#### **MER 510. Advanced Dynamics**

Analytical dynamics with engineering applications to particles and rigid bodies. Topics include three-dimensional kinematics and dynamics, Lagrangian dynamics.

Prerequisites: Advanced Mechanics, Rigid Body Mechanics or equivalent

#### **MER 512. Vibrations of Discrete Systems**

Response of single and multi-degree-of-freedom systems to harmonic, periodic and impulsive excitation. Fourier series and transforms; ideal impulse and impulse response; convolution in the time and frequency domains; matrix and modal methods; system eigenvalues and vectors; impulse testing with a spectrum analyzer.

Prerequisites: Dynamics and Kinematics or equivalent, Calculus, Differential Equations, Mat Lab helpful

### **MER 515. Processing and Selection of Engineering Materials**

A comprehensive examination of processing technologies for engineering materials, and the effects of selected processing routes and materials to meet and satisfy design and applications criteria.

Prerequisites: Mechanics of Materials or equivalent

### **MER 516 Finite Element Methods in Engineering**

This course provides an introduction to the finite element method with an emphasis for solving structural engineering problems. It will cover a review of matrix algebra and the solution to simultaneous linear equations. It will then lead to an introduction of the stiffness method, which will include a review of the equations from elasticity. The method will then be applied to bar and beam equations, followed by 2D plane strain equations. Modeling guidelines will then be covered, along with axisymmetric analysis and isoparametric formulations; finishing up with three dimensional analysis.

Prerequisites: Calculus, Differential Equations, Strength of Materials or Equivalent

### **\*MER 522. Linear Control Systems**

*(Cross-listed as EER 522)*

This course addresses practical control system design primarily from a classical perspective. Beginning with transfer function modeling of dynamic systems, the course moves through transient, root locus, and frequency response analysis to end with frequency domain techniques for controller design.

Prerequisites: System Modeling and Analysis (Circuits and Systems or Dynamics of Physical Systems), Mat Lab/Simulink helpful

### **MER 525 Engineering Optimization**

This course in engineering optimization studies techniques with applications in various aspects of engineering design and other disciplines including: concepts of design variables, constraints, objective functions, penalty functions, and Lagrange multipliers. Techniques for solving constrained and unconstrained optimization problems: classical approaches steepest descent, conjugate gradient, modified Newton, controlled random searches, etc. Applications and examples in the design of engineering components and systems will be presented.

Prerequisites: Calculus, Differential Equations, Mat Lab helpful

### **MER 532. Composites**

This course provides a comprehensive introduction to composite materials and motivation for their use in modern applications. Topics include selection and availability of composite materials, manufacturing processes, useable theoretical concepts, testing and characterization of composites, and strength theories.

Prerequisites: Materials Science, Strength of Materials, or equivalent

**MER 534. Dynamics of a Viscous Fluid**

Analysis of Laminar and turbulent flow fields. Approximate solutions of the Navier-Stokes equations according to boundary layer theory.

Prerequisites: Fluid Mechanics, Thermodynamics or equivalent, Calculus, Differential Equations

**MER 536. Compressible Fluid Flow**

Analysis of internal and external compressible flow fields. Supersonic airfoil analysis according to shock-expansion theory.

Prerequisites: Fluid Mechanics, Thermodynamics or equivalent, Calculus, Differential Equations

**MER 537 Combustion Fundamentals**

The study of the chemical and physical processes in combustion. Analysis of thermochemistry and fuel oxidation, premixed and diffusion flame phenomena, combustion of condensed phases, detonation, combustion in practical systems, and combustion generated air pollution.

Prerequisites: Thermodynamics or equivalent

**MER 538. Fluid Dynamics of Turbo machinery**

Analysis of the energy exchange between a continuously-flowing fluid and a turbomachinery rotor. Study of the design and operating principles of axial and radial-flow turbines, compressors, and pumps.

Prerequisites: Thermodynamics, Fluid Mechanics or equivalent

**MER 540. Thermodynamic Analysis**

Consideration of various particulate and continuum bases for structuring thermodynamic principles and their application to the solution of current and prospective engineering problems.

Prerequisites: Basic Thermodynamics, Heat Transfer or equivalent

**\*MER 541. Thermal Energy Processes**

This course focuses on the analysis of thermal processes relevant to the renewable energy priorities of today's green economy. The underlying engineering principles of thermal processes, which make the best use of sustainable energy sources through proper acquisition, storage and conversion, will be considered. The course incorporates the fundamentals of thermodynamics and heat exchange necessary to understand the components and cycles that enable these thermal energy processes.

Prerequisites: Fluid Mechanics, Thermodynamics, Heat Transfer

**MER 550. Conduction Heat Transfer**

Study of the equations for steady state and transient heat conduction using analytical and numerical techniques.

Prerequisites: Fluid Mechanics and Heat Transfer

**\*MER 551. Superconductivity**

*(Cross-listed as EER 551)*

Superconductivity is a complex physical phenomenon still at the forefront of research. This course is designed to provide a fundamental working knowledge of this technology, the importance and integration of material properties, and a broad understanding/appreciation of the applications in the areas of power equipment and electronics. The course will also focus on active research and technological barriers for future applications.

Prerequisites: Calculus, Electromagnetics (basics), Quantum Mechanics helpful

### **MER 552. Convection Heat Transfer**

Analysis of laminar and turbulent heat transfer processes. Approximate solutions of the energy equation according to boundary layer theory.

Prerequisites: Fluid Mechanics, Heat Transfer

### **MER 553. Advanced Fluid Dynamics**

This course examines the Derivation and Analysis of Laminar and Turbulent flow fields. Approximate solutions to the Navier-Stokes Equations as related to Boundary Layer Theory. Application of Complex Variable conformal mapping techniques to Inviscid Flow.

### **MER 554. Flow and Heat Transfer in Multiphase Systems**

Analytical and empirical methods for evaluation of flow characteristics, particularly in liquid vapor systems and boiling and condensing of heat transfer.

Prerequisites: Fluid Mechanics, Heat Transfer

### **MER 555. Computational Fluid Dynamics (CFD)**

Computational Fluid Dynamics (CFD) employs a combination of Fluid Mechanics, Heat Transfer, and Numerical Methods to solve problems of practical “applied” engineering. CFD allows for a rapid (as opposed to exact solution, if possible, experimental testing) investigation of the thermos-fluid topics covered in previous courses with an emphasis on numerical solutions to those problems. Numerical solution theory and methods will be covered and students will be expected to program in any code/package with which they are comfortable. Upon completion of the course the student will be expected to be able to 1) describe the physics of a given problem in mathematical terms describing the conservation equations, initial and boundary conditions, 2) choose an appropriate numerical solution technique to apply, and 3) be able to write their own code or employ a commercial CFD code in the solution of the problem.

This course will emphasize the STAR-CCM+ commercial code. Having achieved a solution, via visualization/calculation techniques of key parameters and student will be able to assess its validity

### **\*MER 560 Nuclear Engineering and Technology**

*(Cross-listed as EER 570)*

The purpose of this course is provide students of various engineering disciplines a functional knowledge of nuclear engineering principles and those most important to the design of nuclear power generation systems. The course will focus both on the nuclear reactor core as well as plant systems. The intent is that students will gain a physical understanding of nuclear engineering principles as they relate to their own field of interest. Class participation will be highly encouraged and focused through the

discussion of current events in the nuclear industry as well as proposed future nuclear technologies.

**MER 571. System Modeling & Optimization (i.e. Computational Intelligence)**

*(Cross-listed as EER 571, CSc 571)*

Topics include the theory, design, and application of biologically and linguistically motivated computational methods emphasizing neural networks, genetic algorithms, fuzzy logic, and hybrid intelligent systems in which these methods are employed. Special emphasis will be placed on applying these techniques to “real-world” problems, and examples from a broad range of industrial applications will be presented. Homework assignments and a final project are required.

Prerequisites: Undergraduate Calculus and Linear Algebra, Mat Lab helpful

**MER 572. Engineering Statistics**

*(Cross-listed as EER 572, CSc 572)*

Modern engineering practice makes extensive use of statistical methods for the efficient collection and analysis of engineering data, and to support data-based decision making. This course will introduce the statistical tools that are of greatest importance for practicing engineers. Core topics to be covered will include probability and distribution theory, the construction and interpretation of statistical intervals, statistical hypothesis testing, regression analysis and empirical modeling, statistical experimental design, and statistical quality/process control. Additional specialized topics may also be covered, depending upon the interests of the class; possible topics include system reliability analysis, measurement system analysis, process capability analysis (and “six-sigma”), accelerated life testing, and acceptance sampling.

Prerequisites: Advisor approval

**MER 573. Case Studies in Failure and Ethics in Engineering**

*(Cross-listed as EER 573)*

This course provides a broad look at engineering failure and ethics in engineering. It will focus on engineering failure case studies and the principles of applied engineering ethics to understand engineering disasters and to learn from these failures and to prepare engineers for the decisions they may face in their professional careers. Focus is on mechanical engineering.

**MER 576. Motor Acoustics**

*(Cross-Listed as EER 576)*

Development of the fundamental principles and equations for motor noise and vibration. Focus on development of analytical methods for predicting the acoustic performance of motors, along with an overview of numerical methods. Develop an understanding of the key principles and governing equations of motor acoustics. This covers noise generation by the motor, its structural dynamics response, and its sound radiation. Apply those equations to the analytical prediction of the noise sources and acoustic responses of motors. Understand the bounds of applicability of the analytical formulas, and the numerical methods which are available to predict the response of complex motors.

Prerequisites: Applied Calculus and Differential Equations

### **\*MER 580. Fuel Cell Science and Hydrogen Engineering**

*(Cross-listed as EER 580)*

Introduce the student to the science and engineering of fuel cell technology. Emphasis will be on developing an understanding of different types of fuel cells, their applications, and the engineering of complete fuel cell systems. Elements of that class will include: electrochemistry; polymer materials science for proton exchange membrane (PEM) based systems; ceramics for solid oxide fuel cells; liquid-electrolytes for phosphoric acid and alkaline fuel cells; and other methods of generating power directly from a fuel and an oxidant. The system requirements of the fuel cell stack will be introduced to provide a complete picture of the technology. Other elements addressed during the course will include thermochemistry; electrochemistry; fuel processing or reforming; electrical & power management; and polymer science and systems engineering. Developing an understanding of the proton exchange membrane fuel cell will be the primary objective. After completing this course, the student is expected to have an understanding of the technical needs, challenges, and opportunities of fuel cell systems. The overall essence of the class will be to address the essentials of fuel cells and fuel cell systems and related electrochemical systems. Elements of the entrepreneurial aspects of the industry will also be covered. Hydrogen will be discussed throughout the semester as it relates to fuel cells and the emerging changes in power generation models.

Prerequisite: Advisor approval.

### **\*MER 580A. Photo Voltaic Engineering**

*(Cross-listed as EER 580A)*

The course focuses on the physical principles, technology, and design of efficient semiconductor photovoltaics. Course goals equip students with the concepts and analytical skills to understand efficiency limitations, to assess the viability of various solar and thermophotovoltaic technologies, and to introduce the physics required for understanding photovoltaic energy conversion. The course will focus on three primary aspects of photovoltaic energy conversion, (i) the transfer and conversion of solar (i.e. thermal) radiation to electronic energy, (ii) the theory and design of the semiconductor photovoltaic cell and (iii) photovoltaic systems and applications.

Prerequisite: Advisor approval.

### **\*MER 580B. Turbine Engineering**

*(Cross-listed as EER 580B)*

Course on fundamentals of design, analysis, and technology of turbo machinery – jet engines, gas turbines, steam turbines, water turbines, and wind turbines. The course will provide an understanding of all aspects of system development: thermodynamic cycles, design-point and off-design performance; function and design of components (inlets, compressors, combustors, turbines, outlets), operational limits, and environmental concerns; structural analysis, lifting, and materials; rotor dynamics and blade aeromechanics; clearance analysis, sealing, and packing; heat transfer, blade and component cooling; starting and control; power and thrust generation; testing and instrumentation. The student is expected to develop a broad understanding of the state-of-the-art, challenges, and future of turbine systems.

Prerequisites: Basic Structures, Thermodynamics, Fluids.

### **\*MER 580C. Principles of Thermal Systems**

This course will focus on the analysis and modeling of thermal systems as applied particularly to the energy and environmental demands of today. The underlying common principles of thermal systems as related to energy conversion, utilization and storage will be considered. The course incorporates the fundamentals of heat engine and refrigeration cycle analysis, moist air psychometrics, and the dynamic behavior of traditional and renewable energy systems.

Prerequisites: Engineering Analysis, Transport Phenomena or equivalent understanding of thermal systems and analytical capability.

### **MER 580D. Welding**

Welding metallurgy is a technologically important field that covers a wide range of scientific disciplines. This course uses welding metallurgy as a vehicle to introduce basic and broadly applicable concepts in solid state physics, chemistry, materials science, fluid mechanics, and solid mechanics. Topics covered include welding processes, heat and fluid flow, chemical reactions, residual stresses, solidification phenomena, phase transformations, and welding defects. Special emphasis will be placed on applied engineering problems and on the behavior of structural engineering materials. Real life examples will be used to illustrate the fundamental concepts of the course. Homework assignments and a final project are required.

Prerequisites: Materials Science, Strength of Materials or equivalent.

### **\*MER 580E. Solar Energy Engineering**

*(Cross-listed as EER 580E)*

This course is designed to enable the student to effectively grasp the complex and quickly changing solar industry. The course will cover such topics as the economy of solar, photovoltaic devices, systems and applications. In order to cover this broad range of technical topics, the course will utilize multiple instructors. Each instructor has significant expertise and depth in the given field and the student will be able to draw from their experience. Students completing this course will develop knowledge of the solar industry, looking at the past, present and future of this technology area. Students will gain key technical background in every aspect of the industry and will be able to assess new technologies as they are developed. Understanding of the economics of solar and its future will also be obtained.

Prerequisites: Advisor approval

### **\*MER 580F. Wind Energy Engineering**

*(Cross-listed as EER 580D)*

The course focuses on “Wind Farm Project Design and Development” (1/2) and “Wind Turbine Technology” (1/2). Part I: Teams will demonstrate understanding of complete wind farm design/development process inclusive of site selection, wind resource evaluating target land area, turbine choice, location, energy projection, cost and transmission. Part 2: Focuses on technical understanding of Wind Turbine attributes such as structural, blade system, Uacelle system, electrical system, performance, and future opportunities.

Prerequisites: Advisor approval

### **\*MER 580G. Synchronous Electrical Generators**

*(Cross-listed as EER 580G)*

This course covers fundamentals of design and analysis of power generators, such as those used in thermal power plants and wind turbines. The course will address the basic operating principles of the synchronous machine and consider configurations such as would field, permanent magnet, and doubly fed generators. Key topics will include understanding and analysis of the magnetics within the machine, losses and efficiency, thermal performance, mechanical behavior, operation on the power system, and key IEEE and IEC standards. Further topics will include the duty imposed on the machine during service, as well as the duty it imposes on the turbine. The student is expected to develop a broad functional understanding of the current engineering technology, challenges, and future of generator technology.

Prerequisites: Advisor Approval

### **MER 590-591. Independent Study**

*(by arrangement and with approval by academic adviser)*

### **MER 592A. Masters Project**

*(by arrangement and with approval by academic adviser)*

The preparation and writing of an extensive report on a topic of interest between the student and a department faculty member. A single course presented over two terms; one grade will be given for two terms of work only. Enrollment recommended no earlier than the last year of study. See MER 592B.

### **MER 592B. Masters Project**

*(by arrangement and with approval by academic adviser)*

Continuation from MER 592A. Completed writing of the report and its oral presentation. Students must register for MER 592B even though they have previously registered for MER 592A.

### **MER 596-597. Research and Thesis**

*(As arranged by department).*

## **Credit-Bearing Non Technical Electives**

### **\*MER 600. Disruptive Technology**

*(Cross-listed as EER 600)*

This course is designed to prepare the student to be able to efficiently evaluate potential disruptive technologies and their potential for application/commercialization. The course will cover such topics as the CO<sub>2</sub> Mitigation, Solid state Energy Systems, Bio Energy and Fusion that have potential to impact the future. In order to cover this broad range of technical topics, the course will utilize multiple instructors that have technical depths as well as experience in the field.

Prerequisite: Advisor approval.

### **\*MER 601. Sustainability**

*(Cross-listed as EER 601)*

The focus of this course is to build an understanding of what is meant by Sustainable Energy and to be able to analyze a range of different opportunities. The intent is to



perform a value analysis on each opportunity in order to determine which are practical, on a variety of scales, while considering all aspects of the opportunity. Attention will be placed on efficiencies, scale, and impact of each opportunity as well as what limitations may exist.

Prerequisite: Advisor approval.

**\*BOE 610. Fundamentals of The Business of Energy**

An initial umbrella course designed to acquaint the student with the complexities of the present-day power system and how we arrived at this point. It will include a brief history of the industry evolution and will encompass various fuels, types of generation, regulatory authorities, power transmission, distribution, control & dispatch, planning, power markets and revenue flows.

**BOE 611. Planning and Operations of Power Systems**

Operations and planning of power systems will introduce and discuss the decision process regarding generation types, fuels and transmission. Comparisons will be introduced establishing the difference between traditional vertically integrated utilities and unbundled resource suppliers. The principles of electric power systems will be studied along with the impact of deregulation.

**\*BOE 612. Power Markets**

This course will deal with the intricacies of the workings of the power markets (including gas). It will introduce and discuss the evolution from regulated pricing to market pricing. It will introduce and discuss market-based products necessary for reliable operation; hedging principles; and out-of-market products necessary for a fair and reliable market.

**\*BOE 613. Deregulation/Restructuring**

This course will explore the history of legislation, regulation and regulatory authorities in the development of the power industry and its impact on the economy and consumers. The evolution of the relationships between regulators and the regulated; the restructuring of the natural gas and electric industry over the last three decades; and the current regulatory status of both the infrastructure and power markets will also be studied.

**\*BOE 614. Electric Power Industry Economics & Finance**

This course will evaluate the weaving thread of economics and finance as an integral part of operations and strategic planning in the complex energy industry. It will investigate supplier economics and finance under regulation and deregulation environments. It will evaluate market transactions, payment paths, settlements, capital requirements, financial instruments, and procedures that are identified with the industry. It will review economic issues confronting power transmission owners/providers under regulated models and merchant function models. The course will identify and encourage a knowledge-based review of new technologies and green energy as they relate to financial and economic decision making. Energy policies, metering technology, micro-grids, government influences, fuels and storage will all be explored as they relate to various present and future economic and financial models.

**\*BOE 615. Challenges to Upgrading Aging Infrastructure**

This course will examine and evaluate the changing energy horizon as the industry embraces expanding technology, renewable energy, smart grid technology, etc.; to be exercised upon an aging infrastructure. The student will see the critical need for system knowledge and planning to continue to meet the needs and reliability of a sophisticated complex industry struggling to meet the needs of its customers and economic growth.

# SCHOOL OF MANAGEMENT COURSES

MBA students should generally complete core courses early in the program and electives late in the program. MBA Health students should take HCM500, HCM501, and HCM507 as early as possible in the program.

## MBA COURSES

Specific 2015-2016 course offerings are available below. The most up-to-date course offerings are available at [http://www.clarkson.edu/sas/classes\\_schedules/index.html](http://www.clarkson.edu/sas/classes_schedules/index.html) or by contacting the Associate Dean of the School of Business at the Capital Region Campus.

To ensure that students meet appropriate prerequisites for all courses, all graduate students are required to have a plan of study on file that has been approved by the graduate advisor.

600 course numbers indicates advanced courses.

### PRELIMINARY COURSEWORK

#### **MBA 001. Mathematics of Management**

*Online/On demand; Bowman (\$650)*

This course focuses on mathematics useful in modeling management processes. Fundamental concepts of differential and integral calculus and their applications to management are addressed.

#### **MBA 002. Introduction to Probability**

*Online/On demand; Bowman (\$650)*

This course covers marginal, joint and conditional probability; random variables, expected value and variance; selected probability distributions and their uses in management; and sampling distributions and the Central Limit Theorem. Prerequisite: MBA 001.

#### **MBA 003. Microeconomics**

*Online/On demand; Lambrinos (\$650)*

This module in Microeconomics is a preliminary course for the MBA programs. It can be waived for students who have taken a course in Microeconomics at the undergraduate level. The workload is equivalent to half of a normal course so it can be completed at a normal pace in 5 weeks. The course, however, may be started at any time and completed at any pace with the only constraint being that all assignments associated with the module must be completed by June 30 each year. Students should not start the course prior to June 30 unless they are sure they can complete it by June 30. The course will cover demand and supply concepts, elasticity, the impact of taxation, production and cost theory, and perfect competition and monopoly market structures.

#### **MBA 004. Macroeconomics**

*Online/On demand; Lambrinos (\$650)*

This module in Macroeconomics is a preliminary course for the MBA programs. It can be waived for students who have taken a course in Macroeconomics at the undergraduate level. The workload is equivalent to half of a normal course so it can be completed at a normal pace in 5 weeks. The course, however, may be started at any time and completed at any pace with the only constraint being that all assignments associated with the module must be completed by June 30 each year. Students should not start the course prior to June 30 unless they are sure they can complete it by June 30. The course will cover the definition of Gross Domestic Product, the Consumer Price Index, labor force definitions and concepts, productivity concepts, the Federal Reserve System, the aggregate demand-aggregate supply model of the economy and the impact of fiscal and monetary policy on the economy.

**Note:** Payment for SOM Preliminary courses (001, 002, 003, 004) is due within 1 month of registration. There are no refunds after 1 month of registration. Drops are due 1 month after registration to avoid a failing grade and/or financial penalty. Course work may be completed at any time, but must be completed before a subsequent credit bearing course is taken which requires one of these preliminary courses

## **MBA COURSEWORK**

### **MBA 506. Statistical Models for Management**

*Fall; Oppenlander/Winter; Oppenlander/Summer (online); Poeth*

This course emphasizes statistical approaches (confidence intervals, hypothesis testing, regression analysis, chi-square tables) that support managerial decision-making. Examples of such decisions include determining the best of several suppliers or appropriate salary levels based on education and required skill. Examples from quality management, such as capability analysis and control charting will also be included. Emphasis will be placed on problem statement formation, translation of problem statements into quantitative terms, and finding appropriate data to reach supportable conclusions. Analysis will be performed using statistical and other software. Prerequisites: MBA 001 and MBA 002.

### **MBA 510. Financial Accounting**

*Fall (online); DeJoy/Fall; DeJoy/Winter; DeJoy/Summer; DeJoy*

An introduction to the “generally accepted accounting principles” of financial accounting as applied to publicly reported financial statements. Emphasis is to be placed on understanding the application of “generally accepted accounting principles” to financial statements. This course is designed for individuals with no prior academic or professional education on the topic of financial accounting.

### **MBA 512. Managerial Accounting**

*Fall; Williams/Winter, Online; McDonald/Spring; McDonald/Summer; Williams*

An introduction to the tools and techniques of financial analysis and decision-making. Topics covered include financial statement analysis, cost classification and behavior, cost-volume-profit analysis, incremental cost analysis, time value of money, capital budgeting, and financial planning. Spreadsheet programs are used in this course.

Prerequisite: MBA 510. Students are expected to be proficient in the use of Microsoft Excel®.

### **MBA 517. Advanced Corporate Finance**

*Fall, Winter, Spring; Feng*

This course covers advanced topics in corporate financial management. The analytical skills necessary to evaluate complex financial problems are developed through case studies. Topics covered include: advanced capital budgeting, agency theory, option theory and applications, measuring and hedging financial risk, merger and acquisition analysis, corporate financial analysis and planning models, and short-term financial management.

Prerequisites: MBA 506, 510 and 512

### **MBA 525. Marketing Management and Strategy**

*Fall, Winter online/Spring; Carlson*

This course is primarily designed to provide students with knowledge relevant for managing current marketing efforts. Topics covered in this course include buying behavior of consumers and businesses, market segmentation, marketing environments, marketing research, positioning, product management, brand management, services management, pricing management, retailing/marketing channel management, and promotion management.

### **MBA 531. Operations Management**

*Fall, Winter; Kauffman / Spring online; Bowman / Summer; Phillips*

This course starts with a look at total quality management with an emphasis on the Six Sigma approach to process improvement. Next, the fundamentals of inventory management are discussed with the primary objective being to understand the causes of inventory and how to effectively reduce inventory levels. This topic is expanded into the important topics of lean supply chain design and management, and lean production management. A balanced approach is taken with coverage of tools but also an emphasis on the impact of strategic and managerial decisions on the effectiveness of various approaches to operations management.

### **MBA 545. Business Driven Information Systems**

*Fall, Strang; Otto/Spring, Hybrid-blended online/on-site; Otto/Summer, Online; Otto*

The course focuses on the business value that can be achieved when organization deploy information systems. The issues covered include planning an IT application portfolio, enabling business processes with IT, and implementing IT systems. The applications covered include transaction processing systems, decision support systems, knowledge-based systems and social media. Participants will work in a group environment on cases, presentations, and a project report.

An IT background is not required and this is not a “technical” course. This is, however, an integrative course, including issues of business strategy, finance, and the study of organizations and people. The creation of business value requires the successful integration of these issues with potential of information systems.

**MBA 551. Managing People and Teams in Organizations**

*Fall – 9/18-20 On-site plus term; Belasen/Spring; Stephenson*

This course approaches management issues from the “human” side. It provides individuals with the opportunity to learn management skills and concepts through hands-on experiences in the class. Particular attention is paid to relevant organizational behavior psychology concepts such as motivation, leadership, communication, performance appraisal, job satisfaction and others. Additional course outcomes include ability to interact more effectively in groups and how to express oneself convincingly both verbally and in writing. The course provides students with experiences and knowledge that can be applied immediately when they finish the course.

**MBA 571. Ethical Principles of Business (1/2 course)**

*Fall, Belasen / Winter; Belasen*

This course examines issues of team functioning, ethics, and managing differences all in an increasingly global business environment. Students work individually and in groups to improve written and verbal communication skills.

**MBA 572. Legal Aspects of Business (1/2 course)**

*Fall; TBA /Winter; Valle*

The objectives of the course are to enable the business manager to identify situations with legal implications and to interact effectively with professional legal counsel. Particular areas of the law examined during the course are contracts, sales, negotiable instruments, negligence, product liability, secured transactions, employment law, business organizations, government regulation and ethical considerations.

Not open to JD/MBA students.

**MBA 606 Advanced Statistics and Data Visualization**

*Winter (online); Doganaksoy*

This is an applied course on advanced statistical techniques that are commonly used in health care and business settings. The course will be based on case studies that incorporate typical challenges of a real-life application: Large data sets with mixed types of variables (e.g., qualitative and quantitative), missing data, lurking variables, correlated variables and uncontrolled variation. The course objective is to enable students to become effective users of advanced statistical techniques in support of business decision making. The topics covered will include logistic regression, multivariate analysis (principal components, clustering, discriminant analysis), partitioning analysis, and time series modeling. Students will learn to identify high impact application opportunities for each technique, plan and execute their own data-based investigations, apply the appropriate statistical modeling technique, and report their findings and recommendations. The role of effective data visualization as a key element in modern data analysis and presentation will be emphasized throughout the course.

Prerequisites: MBA 506

**MBA 607 Data Architecture**

*Winter (online); Otto*

Database management systems are standard tools that enable the storage and retrieval of data within modern information systems. Database concepts are now an accepted part of

most computer science courses. These introductory units tend to concentrate on the use of relational database systems. This advanced module, in contrast, deals with implementation aspects of relational systems and provides students with the knowledge of the current enhancements to relational database systems, distributed database systems (e.g. Hadoop) object oriented database and XML database systems. The course will also include an introduction into SQL to query relational databases.

Prerequisites: HCM 648 or MBA 545

### **MBA 610. - Fraud and Forensic Accounting**

*Spring (online): DeJoy*

This MBA course is designed as a seminar. The primary goal of this course is to assist students in recognizing fraud, which will aid in the prevention and detection of fraud. This course will focus on the professional responsibility of accountants to act ethically. The course materials will discuss what a fraud is, how frauds can be committed, how frauds can be uncovered, and what accountants and business executives can do to prevent frauds from occurring in their organizations. We will use a variety of materials that were provided by the Association of Certified Fraud Examiners. In addition, students will analyze fraud case studies.

### **MBA 611. Personal Financial Planning**

*(Not offered 2015-16)*

This two-part course first presents an examination of personal financial planning in a global environment encompassing topics such as personal budgeting, insurance coverage, investment planning, managing credit, retirement planning and estate planning. The course then extends the topics to related domestic and international tax issues of income tax considerations for individuals, corporations and partnerships. Knowledge of the current business environment (tracked through the Wall Street Journal, Business Week, online at CNNFN.com, etc.) will be expected.

Prerequisites: MBA 510 and 512

### **MBA 612. Advanced Management Accounting**

*Winter; Kabalian*

This course is designed for students who have completed an initial course in Cost Accounting at the undergraduate level, or Management Accounting at the graduate level. Topics include budgeting, product costing including activity-based costing, accounting-based managerial and divisional performance metrics, and transfer pricing.

Prerequisites: MBA510, MBA512

### **MBA 613. Advanced Auditing and Research**

*Fall (online); DeJoy*

This course is an advanced case and research-oriented study of topics in Auditing. Through a series of cases and related research, students will engage in the practice of auditing using real-world situations as the foundation for technical and theoretical discussions of issues facing the contemporary auditor. Cases will be chosen to reflect current and emerging topics in the practice of public accounting, financial auditing, fraud investigation, and forensic accounting. Auditing communications tools and software-based audit techniques will also be emphasized.

Prerequisites: Undergraduate Accounting Degree or Permission of Instructor

### **MBA 618. Mergers, Acquisitions and Corporate Restructuring**

*Spring; Feng*

Restructuring is essential to the long-term survival and prosperity of any corporation due to the ever-changing business conditions and regulatory environment. In this course, we will investigate internal restructuring – shifting resources from mature declining business activities to existing or new business activities with more attractive growth potential, as well as external restructuring, known as mergers and acquisitions (M&A's). M&A's can be broadly defined to include expansion through divestitures or sell-offs; various changes in corporate control and ownership, including going private and leverage buyouts; and rearrangements through recapitalization or bankruptcy. We will examine restructuring transactions, focusing on the significant impacts of restructuring on the corporation's assets, liabilities, and equity claims. We will learn and understand the economic motives for undertaking restructuring, such as enhancing competitive advantage, achieving strategic diversification, improving economies of scale and scope, reducing funding and transaction costs, and increasing market power.

### **MBA 619. Investments**

*Winter, Summer; Feng*

This course provides an in-depth analysis of modern investment analysis and portfolio management techniques. Current theory, empirical evidence, and institutional practices are considered. Topics covered include portfolio theory and asset pricing models, market efficiency, fixed-income portfolio management and immunization, equity valuation models, the valuation of options, futures and other derivative securities, portfolio management and performance evaluation, and international diversification.

Prerequisites: MBA 510, MBA 512, and MBA 517 or HCM 617

### **MBA 620. Investment Management**

*Spring; Johnson, Smirensky*

The preliminary goal of this course is to provide students with an opportunity to gain valuable hands-on experience in fiduciary management of investment assets, such as security research, valuation of risky assets, asset allocation, and portfolio management. Investment is a field of business where intuition often plays a more important role than theoretical knowledge. In this course, we discuss the rapid development in investment theory that helps us identify the factors that are responsible for price movements. We focus on how to apply theory into practice. Students will work on challenging, integrated, analytical projects using real time capital market data. This course will increase the student's knowledge in industries such as equity research, investment banking, commercial banking, and corporate finance.

Prerequisites: MBA 510 and 512

### **MBA 624. Sports Economics**

*Spring; Lambrinos*

Topics covered in this course include the measurement of competitive balance and its impact on sports leagues; discrimination in sports; efficiency of sports teams and individual athletes; labor unions and labor relations in professional sports; the efficiency of sports wagering markets; and the estimation of marginal product for professional athletes.



Prerequisites: MBA 506 and 520

### **MBA 625. Marketing Communications**

*(Not offered 2015-16)*

Given today's rapidly changing media environment, it is essential for managers to understand how marketing communications operate in the marketing mix of contemporary firms. In this course, we will spend the majority of the time talking about what lies behind the marketing messages people see every day. When most people think about advertising, they think about the creative side—the clever slogans and attention getting pictures and illustrations. However, it requires a lot of research, strategic thinking, and a thorough understanding of the consumer behavior for these clever slogans and graphics to be effective. In addition, we will learn about analytical methods and data sources to allow managers to choose media for reaching customers in the most cost-effective manner. Finally, the marketing applications of new media, internet communications, and social networking will be explored.

Prerequisites: MBA 525 or HCM 526

### **MBA 626. Marketing Research Techniques**

*Fall, Spring; Carlson*

Marketing research is primarily conducted to reduce the amount of uncertainty managers would otherwise face in their decision-making. This course is designed to develop students' knowledge of marketing research by both exposing them to many major important issues involved with marketing research and requiring them to complete a marketing research report from start to finish. Topics discussed include research designs, data collection methods, survey development, measurement, sampling methods and sample size determination, descriptive statistics, parameter estimation, independent samples t-test analysis, correlation analysis, chi-square analysis, code sheet development, non-sampling errors, and ethics in marketing research.

Prerequisites: MBA 506 and 525 or HCM 526

### **MBA 627. Marketing High Technology Products**

*(Not offered 2015-16)*

This course will develop an understanding of strategies and practices involved in marketing technologically oriented products and services and to see how and why these strategies differ from marketing of non-technical products/services. In general, this course will focus on honing market analysis skills to leverage decision-making in the high-tech context. This course will enhance skills in analyzing industry trends, identifying threats and opportunities, designing suitable products and marketing strategies to best suit market/environmental conditions, market segmentation and analysis, and in assessing/monitoring a firm's relative advantage via competitive intelligence. Specific additional topics will include pricing, new product introduction, e-business, selling and sales management.

Prerequisite: MBA525

### **MBA 628. Consumer Behavior**

*Winter; Carlson*

This course is designed to enhance students' understanding of consumers. Topics explored involve the many, many influences that may shape an individual's behaviors in

the marketplace, including the impact of these influences on managerial decision-making situations. Observational research methods are also covered.

Prerequisite: MBA 525 or HCM 526

### **MBA 629. Money, Markets and Banking**

*Winter, Summer; Murtagh*

The course covers the nature and functions of money and finance in the economy. Commercial and central banking, monetary theory, and monetary policy are also considered.

Recommended: MBA 517 or HCM 617

Prerequisites: MBA 510 and 512

### **MBA 632. Quality Systems Management**

*(Not offered 2015-16)*

This course examines quality improvement approaches in the context of overall organizational objectives. Topics include: the contents and impact of important government and industry standards such as ISO 9000; Six Sigma, including the Measure-Analyze-Improve-Control model (MAIC) and Design for Six Sigma (DFSS); extensions to benchmarking and quality functional deployment; advanced tools, such as systems reliability and maintainability and life data analysis.

Prerequisites: MBA 506 and either MBA531 or HCM505

### **MBA633. The Role of Statistics in Business and Industry**

*(Not offered 2015-16)*

This course will cover the key problems in business and industry (from product design to reliability assurance to field support) and then show how statistical approaches are used to address them. In addition to gaining exposure to real-life applications of basic statistical tools (e.g., regression analysis, interval estimation) that they have already learned, students will also gain exposure to more advanced tools (e.g., reliability modeling) which are commonly used by practitioners.

Prerequisite: MBA506

### **MBA 635. Project Management**

*Spring; Kauffman*

A project is a one-time or infrequently occurring operation with a unique goal, a limited lifespan and limited resources. This course will focus on the basic components of project management, including statements of work, project selection, leadership and team building, communication, budgeting, resource scheduling, metrics and closure. Students will have the opportunity to develop a project plan of their own choosing using MS Project as well as explore current issues in project management through case discussions.

Prerequisites: MBA 531 or HCM 505

### **MBA 640. Integrating eSystems into Global Businesses**

*(Not offered 2015-16)*

The objective of this course is to introduce participants to web-enabled commerce, strategies, critical issues and applications. The issues we will cover include business planning and strategy development for E-Commerce processes, identification of critical success factors, security threats, and the implementation of EC application to facilitate

global business processes. The applications we will discuss in class include front- and backend systems, transaction processing systems, and collaboration technologies such as customer relationship management, supply systems, and collaboration technologies such as customer relationship management, supply chain, and web-enabled decision support systems.

While the course is focused on managerial issues of E-Commerce, participants need to have a good understanding of the underlying technology, which facilitates the data exchange. Participants will work in a group environment on cases, presentations, and a project report.

Prerequisites: MBA 545 or HCM 648

### **MBA 641. Business Process Simulation**

*(Not offered 2015-16)*

In this course, students build and utilize computer simulation models to analyze a wide range of systems. Applications include restaurants, doctors' offices, customer call centers, and many others. Models are built using specialized simulation software as well as Microsoft Excel.

Prerequisites: MBA 506 and MBA 531 or HCM 505

### **MBA 643. Systems Analysis & Design for Managers**

*(Not offered 2015-16)*

Information Technology is pervasive in today's organizations. For many firms, IT is the single largest capital investment, often exceeding 50% of capital expenditures. As a result, in this course we take the strategic perspective of the general manager and study how organizations can get more value from their IT investments by the successful design, development and implementation of a Computer Information System. Through the use of a semester-long, hands-on project, the students will have the opportunity to put the concepts learned into practice. Participants will learn the Unified Modeling Language and be introduced to the Unified Process Methodology. Both of these tools represent current industry standards for software engineering practice. During the course you will practice your skills through both individual and team assignments. The course will culminate with the development of an integrated systems project to demonstrate acquired knowledge.

Prerequisite: MBA 545 or HCM 648

### **MBA 650. Competing by Design**

*(Not offered 2015-16)*

Design often signals a shift in strategic emphasis and patterns of organizational performance. Design can also be used to shape an organization's tone or operating style. Dramatic and lasting restructuring or reengineering plans often fail without the mindset of change architects who share the new strategic vision and corporate values. The ultimate goal of design is to use organizational structures, systems, and processes creatively as a sustainable source of competitive advantage. This course focuses on examining how successful corporations leverage competitive advantages through restructuring and external alliances. Students will apply theoretical knowledge and conceptual models to analyze organizational structures, diagnose organizational design,

and evaluate a range of design options and implementation strategies available for transitioning organizations.

Prerequisite: MBA 551 or HCM 501

### **MBA 651. Communicating Globally**

*Summer (online); Belasen*

An increasingly global marketplace affords organizations all over the globe the opportunity to conduct business and distribute goods and services to new customer bases with unique needs and interests. At the same time, globalization presents company leaders, corporate communicators, and organizational gatekeepers with the challenges inherent in intercultural communication. This course introduces a way of thinking that enables students to acquire cultural competence and function effectively in diverse cultural situations. It presents essential concepts of corporate and national cultures and examines key differences in communication, decision making styles, and pattern of interactions in multi-cultural teams and cross-cultural negotiations - laying the foundation for necessary behavioral adaptations.

The course begins with a discussion of the major facets of international business with the cultural aspect presented as the most challenging dimension. Students discover the reasons that cultures form and persist, as well as the variation and interdependence of cultures across the world. In addition, students are exposed to a variety of ideas about cultural values in different nations, and how those values influence management decisions and organizational practices. The readings build upon students' existing knowledge of the functioning of American and Western European business organizations, and help them develop an understanding of how organizations function in a wide variety of cultures.

The course puts a strong emphasis on interactions and practical applications in real world business and professional situations. This practical dimension is enhanced through cases, interviews, and field studies.

### **MBA 652. High Performance Leadership**

*Spring; Belasen*

This course emphasizes cognitive skills and experiential practicum learning applied to ongoing leadership and organizational problems. Students learn about leadership roles and competencies essential for building and supporting organizational capabilities and business strategies in global markets. The course also enables students to learn a method to diagnose their strengths and weaknesses in leadership capacities and measure their proficiencies against benchmarked models of high performance leadership.

Prerequisite: MBA 551 or HCM 501.

### **MBA 653. Organizational Development and Transformation**

*(Not offered 2015-2016)*

This course considers the theory and practice of planned organizational change. Students are exposed to a variety of intervention techniques applicable in a wide range of organizational settings. Lectures are complemented with participatory exercises and interactive discussions.

Prerequisite: MBA 551 or HCM 501.

**MBA 654. Labor Relations**

*Summer (online); Ari Belasen*

This comprehensive course ties together the history of modern labor movements in the United States with issues facing workers in the Twenty-First Century, including the impact of globalization and international outsourcing. Subtopics include negotiation, conflict resolution, and workforce diversity. In addition, a comparative study on international unions will be examined. Each week, current events and their implications for labor relations will be discussed.

Prerequisite: MBA 551 recommended.

**MBA 656. Ethical Issues in Management**

*(Not offered 2015-16)*

The purpose of this course is to develop a general management perspective that includes the abilities to: 1) identify ethical issues in management, 2) analyze these issues in terms of several important frameworks for ethical reasoning and 3) appreciate the central role of ethics in managerial decision-making. Issues from a variety of the functional areas of business – including accounting, marketing and advertising, financial services, human resources, and information technology – will be considered. The course will rely heavily upon the case analysis method, group discussion, and group presentations.

Prerequisite: MBA 500

**MBA658. Women and Management**

*(Not offered 2015-2016)*

Several scholars on organizational behavior have acknowledged that organizational cultures are “gendered.” For example, although women and men have reached numerical parity in management overall, fewer women than men lead organizations, including the powerful Fortune 500 organizations. This course will examine the status of women in management and discuss issues that women managers face, including differences in leadership styles, obstacles to advancement, and pay, benefit and resource inequity. This course also addresses themes of ethical decision-making, authority, power and leadership and conflict in organizational life. We also discuss interconnections among equality issues: sex, race, class, age, sexual orientation and disability. Women managers in the Capital District will discuss their personal experiences with gendered organizations and apply the theories and empirical research presented in the readings to their personal experiences.

Prerequisites: MBA551 or HCM 501

**MBA 660. Executive Decision Processes in Global Environments**

*(Not offered 2015-16)*

International management is one of the major challenges facing organizations in the hypercompetitive global marketplace. Companies that once served a specific geographic area or serviced a specific need have learned to compete with anybody, anywhere, anytime. Needing to diversify in order to compete effectively, an increasing number of multinational companies are finding it essential to anticipate changes and innovate continually to become world-class organizations. Global management requires visionary leaders and strategic thinkers who are driven by a customer focus and continuous improvement, supported by a fluid virtual organization and sustained by creative human

capital and extensive information technology. These leaders must also recognize the existence of cognitive barriers to decision-making and how to overcome decision traps and make better choices for their multinational companies. Using Internet-based search engines, cases, and small group projects, students will have hands-on experiences and acquire the skills necessary to become successful decision makers for multinational companies.

Prerequisite: MBA 551 or HCM 501

### **MBA 661. International Finance**

*Fall; Feng*

An analysis is made of international financial markets and the special problems and opportunities associated with the financial management of multinational firms with a special emphasis on the global emerging markets – from the traditional BRICS to the Frontier Markets. The international monetary and banking system (including the World Bank and IMF), balance of payments, and economic parity relationships are also examined. Foreign exchange and interest rate risk management, arbitrage, international equity and debt financing activities, derivatives, multinational capital budgeting, political risk, international taxation issues and diversity of financial reporting are considered. Coursework involves an intensive team research project focused on a specific country and the international financial exposures of select global corporations.

Prerequisites: MBA 506, 510 512 and 517 or HCM 617

### **MBA 662. International Business**

*Fall; Shaye*

This course examines international business management as influenced by the important economic, political and cultural environment within which businesses must conduct international trade and investment. The problems and issues confronting international managers are evaluated related to a firm's strategy, organizational structure, manufacturing, material management, marketing, R&D, human resources and finance. Competitive strategies are examined that have been successful in leading international companies. Case studies are used extensively to illustrate the relevance of these topics in the practice of international business.

### **MBA 664. Entrepreneurship**

*Fall; Cococcia, Dussault*

The primary objective of this course is to develop an awareness of the process of new venture creation, whether it is an intrapreneurial or entrepreneurial event. The skills, knowledge and attitudes important for creating new ventures, and the complex tasks faced by individuals who start and manage new and growing businesses as well as corporate ventures and franchises will be addressed. The course is designed to provide a broad overview of management and financial issues. We will pay particular attention to: entrepreneurial decision-making, techniques entrepreneurs and investors use for evaluating and testing the feasibility of business opportunities, understanding the impact of market and industry forces on start up, performance and survival of new ventures, financing a business opportunity, etc.

Prerequisite: MBA 551 or HCM 501

### **MBA 665. International Marketing Management**

*Spring; Shaye*

This course examines development of international marketing strategies, from determining objectives and evaluating international market opportunities through coordinating strategies in world markets. Particular emphasis is placed on application of marketing principles in the multinational environment.

Prerequisite: MBA 525

### **MBA 667. Leaders on Leadership**

*(Not offered 2015-16)*

Through a series of interviews/presentations by highly regarded leaders, this course will provide students with an understanding of what it takes to be a dynamic organizational leader. In addition to learning about the current challenges faced and strategies employed by these outstanding professionals, the course will focus on steps new managers can take on the job to enhance their chances for success. Building upon a base of classic academic literature, current books and articles on the topic of leadership will be explored.

Teams of students will be tasked with preparing supporting materials for the speakers featured during each class session. This will require reading material focused on the assigned topic, formulating questions for the speakers, and helping to facilitate the speakers' presentations during class. Other course assignments will include preparation of case studies related to the various topical areas addressed during the course.

Prerequisites: MBA 551 or HCM 501

### **MBA 668. MBA China Study**

*Fall- Winter Break; Chudzik*

This China Study course will give students a better understanding of "How to do business in China." The course will include a ten day visit to Shanghai and a three day optional visit to Beijing in the month of December. The visit will include visits to international U.S. and E.U. companies, Joint venture companies and Chinese companies in a variety of industries. Lectures/discussions on business-related topics from Professors from leading Chinese business schools will be part of the trip. Visits to top cultural places will also be included. Each student is required to conduct a research project, write a research paper and present their findings. The research paper will be completed in draft form before the trip in the fall term. In addition, two Harvard case study analysis will be done prior to the trip in the fall term on cases related to the research. The intent is that the December trip will offer the opportunity to perform primary research that will confirm or supplement the findings of the research. The final research paper and presentation will be done in the winter term. This will be a course for MBA credit and will be considered a Management advanced elective course designated as global. The course will be limited to approximately 15 students. Mel Chudzik who has lived and worked in China will be the professor and will accompany the students to China.

### **MBA674. Growing an Entrepreneurial Business**

*Winter: Cococcia, Dussault*

This course will focus on the challenges in growing a small to medium size business. The issues facing an entrepreneur when starting a new venture are very different than those he/she faces when growing an existing company or business. The course focuses on the unique issues an entrepreneurial leader faces as he/she looks to grow and scale

their business. We will discuss and analyze the issues surrounding effectively scaling a business, and the impact that various decisions and initiatives have on the chance of success. How issues such as strategic marketing, team building and top-grading, financing, partnerships and leadership impact the growing business will be presented and discussed from the perspective of the business leader or entrepreneur. The course will include case studies, lectures, guest speakers, and discussions.

### **MBA 675. Foundations of Human Resource Management**

*Winter; Paludi*

An introduction to the theory and practice of human resource management that examines the psychological, economic, political, legal and managerial aspects of the following functions: recruitment and selection, job analysis, human resource planning, training and development, foundations of selection, employee rights and ethics, and equal employment opportunity. The focus of this course includes profit, non-profit and governmental organizations with particular emphasis on healthcare delivery firms. Prerequisite: MBA 551 or HCM 501.

### **MBA 676. Managing Human Resources**

*Spring; Paludi*

An introduction to the theory and practice of the following human resource management functions: performance appraisals, establishing rewards, pay plans and benefits, health and safety in the workplace, workplace violence, effective workplace communications, discipline and corrective action, labor relations and collective bargaining. Three perspectives will be addressed in each function: management, psychological and legal. The focus of this course includes profit, non-profit and governmental organizations with particular emphasis on healthcare delivery firms. Prerequisite: MBA 551 or HCM 501.

### **MBA 677. International Human Resource Management**

*Summer; Paludi*

International Human Resource Management will focus on how effective human resource policy and practice contributes to a global company's competitiveness. This course will be considered within the context of strategic business objectives, culture, and resource management constraints given by the various national entities. Special focus will be placed on understanding the unifying human resource policies that support the strategic objectives of a global organization. This course will draw on practical examples from companies that have experienced challenges of international human resource management.

Prerequisite: MBA 551 or HCM 501.

### **MBA 681. Strategic Management and Leadership (MBA Capstone)**

*Winter, Spring; Chudzik*

This required course provides students, near the completion of their MBA programs, with an opportunity to integrate all they have been learning. This course prepares students to be leaders and strategic thinkers as part of running a business. Students participate in a team, consulting with a real company to explore a business venture and develop a complete business plan for that venture. The business plan is intended to be realistic and executable by the client. This is not an academic exercise. Students learn by developing



the business plan in phases over the term. Each team will work closely with a company and deliver a final product in the form of a written business plan and a summarizing presentation given before a panel made up of the CEO's of participating companies. Students must be near completing their MBA program and have completed the primary core courses. You with your advisor will decide if the prerequisites have been met.

### **MBA 682. Management Science**

*Winter; Bowman*

Management science refers to the use of mathematical/computer models to solve managerial problems or help make managerial decisions. This course covers the management science tools most widely used in industry (mathematical programming, queuing theory, decision analysis, network models of project management, and an introduction to simulation). Students will learn the solution procedures associated with each approach, utilize software to implement the procedures, and conduct case studies using the computer models.

Prerequisites: MBA 506 and 531.

### **MBA 683. Management Internship**

*No fee; Fall, Winter, Spring, Summer*

### **MBA 690. Independent Study**

Written permission of the Dean is required.

## **MBA IN HEALTHCARE MANAGEMENT COURSES**

### **HCM 500. Introduction to Health Systems**

*Fall, Online; Strosberg/ Fall, On-site; Strosberg*

(Cross-listed as LIM 502)

This course examines the determinants of health, illness, and medical care utilization, institutional arrangements and settings for the delivery of acute and chronic care, the doctor-patient relationship, resource allocation and financing, and measuring and evaluating system performance. This is a prerequisite to all advanced health courses.

### **HCM 501. Health Systems Management**

*Fall, 9/18 – 9/20; Stephenson / Winter; On-site; Stephenson*

This course examines the various aspects of managing in the modern health care environment. A variety of methods including lectures, case studies, in-class exercises, and student presentations will be used. Topics covered include quality improvement, ethical management, managing diversity, communications, leadership, motivation, team building, and conflict resolution.

Prerequisite: HCM 500.

### **HCM 505. Health Operations Management**

*Winter, online; Smith / Spring On-site; Smith*

This course instructs the students in quantitative methods useful for analysis, improvement, and design of efficient and effective organizational processes within a health-care organization. Operations management (OM) is concerned with evaluating the

performance of operating units, understanding why they perform as they do, designing new or improved operating procedures and systems for competitive advantage, making short-run and long-run decisions that affect operations, and managing the work force. Health systems OM is the analysis, design, planning, and control of all steps necessary to provide a service for a client. The course will involve readings from a selected text, review of published studies, exercises in internal and external benchmarking, and exploration of the tools and methods promoted at the national level.

### **HCM 507 Proseminar in Healthcare Leadership**

*Fall 9/10 – 9/13; Huppertz & Smith*

This Proseminar will provide students with an introduction to the role of management and leadership in healthcare. It includes a preliminary overview of the U.S. health system and changes occurring in the healthcare environment, as well as an introduction to ethical reasoning and ethics as they apply to the healthcare industry. Students will also learn communications concepts and skills required of leaders. The course will involve an intensive three-day on-campus residency, in which students will receive classroom lectures, participate in exercises, hear guest speakers from healthcare organizations, and complete projects as assigned. After completing the 3-day on-campus residency, students will continue the course independently and online, completing an assignment by the end of the Fall term. The Proseminar is designed to provide students with a framework with which they can interpret material to be covered in successive courses. In addition, they will have a unique opportunity to meet and network with healthcare leaders, faculty members, and student colleagues.

The course will require some online work beyond the 3-day intensive on-campus residence to be completed during the subsequent term.

### **HCM 510 Health Care Accounting and Finance**

*Fall (online); Gavin*

The course covers use of financial statements and financial management in a regulated environment for taxable and tax exempt healthcare entities. Topics covered include: reading, interpreting and analyzing healthcare entity financial statements, time value analysis, valuing healthcare entities and assets, financial decision making and capital budgeting.

### **HCM 526. Health Systems Marketing**

*Fall, online; Huppertz / Winter, On-site; Huppertz*

This course introduces students to the principles of marketing and their application to healthcare settings. At the end of this course, students should a.) Understand what marketing can do for the healthcare organization in terms of contribution to strategic planning, building business, strengthening relationships between the organization and its constituents, and achieving competitive advantage. b.) Clearly understand how to use health data in marketing planning and implementation. c.) Appreciate the challenges of evaluating the effectiveness of marketing communications investments made by healthcare organizations. d.) Understand the relationship between patient/customer satisfaction and service quality in health organizations. e.) Understand how to judge marketing communications quality, both qualitatively and quantitatively. f.) Demonstrate effective communications skills through in-class participation, writing assignments, and

class presentations. g.) Analyze marketing problems and select effective strategies for solving them. h.) Understand key marketing concepts and their applications to business and healthcare organizations.

### **HCM 601. Swiss Healthcare Delivery System**

*(Not Offered 2015-16)*

This Study tour will give Healthcare MBA students a better understanding of the healthcare delivery system in Switzerland. Students will have an opportunity to visit research hospitals, R&D centers, and pharmaceutical companies and learn firsthand about the unique characteristics of the system. We will also have seminars where experts in the field will discuss current issues in terms of healthcare delivery.

### **HCM 604 Hospital Analytics**

*Summer (online); Scimeca*

An application of principles of analytics to hospital settings, problems, and strategic issues. Students will learn the array of alternative platforms hospitals use for collecting, storing, and distributing data within the hospital-health system setting, including data displays, analytical modules, and user interfaces. Students will also work with hospital data to answer clinical and strategic questions that senior leaders pose, and understand the promise and limitations of the data. Finally, students will be exposed to issues related to data communication and sharing among internal constituencies including owned physician practices and subsidiaries, related parties (e.g., PHO's and voluntary physicians), and Health Information Exchanges through RHIO's.

Prerequisites: MBA 606, 607, HCM 642

### **HCM 606 Payer Analytics**

*Fall (online); Lichtig*

Health insurers and healthcare providers share a common mission of improving health however their means to achieving their mission vary materially. This course will focus on the analytics health insurers utilize to facilitate affordable, quality healthcare. We will discuss and analyze the approaches health insurers take to discover and communicate meaningful patterns in data from historical information reporting to future predictive modeling. Upon completion of this course, the student will have been exposed to key payer analytic frameworks and tool sets used to drive success within a health insurer.

Prerequisites: MBA 606, MBA 607, HCM 642

### **HCM 607 Health Care Operations Research**

*Spring (online); Bowman*

Health Care Operations Research examines several of the Operations Research models most widely used in the Health Care industry. The primary goal is to enable students to become productive consumers of Operations Research for the support of Health Care Management decision making. Students will learn to recognize opportunities for Operations Research analyses, perform basic analyses, report their findings in non-technical terms, and direct or interact with more complex analyses. Operations Research methodologies covered will include Linear Programming, Queuing Theory, Simulation, and Decision Analysis. Applications to staffing, scheduling, capacity planning, facility layout, facility location, and inventory management will be covered.

Prerequisites: MBA 002

### **HCM 609 Customer Relationship Management**

*Summer (online); Haimowitz*

This course provides a practical overview of how to design and implement modern digital customer relationship marketing. Topics to include: customer insight mining, social media and search analyses, segmentation, customer database design, promotional media selection, campaign operations, sales force automation, digital engagement analytics, and ROI measurement. Textbook and other readings will be supplemented by a small-group case study project that students develop throughout the term.

Prerequisites: MBA 506, HCM 648 or MBA 545

### **HCM 617. Healthcare Finance**

*Winter On-site, Spring Online; Gavin*

This course covers financial management in a regulated healthcare environment. Topics include cost-finding and third-party reimbursement, contemporary issues in healthcare financing, sources of capital, capital budgeting, financial planning and analysis, cost accounting, and managed care issues.

Prerequisites: MBA 510 & 512.

### **HCM 620. Health Economics**

*Fall, On-site; Lambrinos / Fall, online; Lambrinos*

This course is intended for students entering the health field and investigates economic approaches to problems and solutions. Students obtain an understanding of how economics contributes to public and private decision-making in healthcare, and learn to properly interpret economic research results and apply them to work performed by health planners and administrators.

Prerequisites: HCM 500, MBA 506 and 520.

### **HCM 642, Data Analytics and Business Intelligence**

*Spring (online); Otto*

This course provide an introduction to Data Analytics and examines a set of information systems, which specifically support managerial decision makers: Decision Support Systems, Group Decision Support Systems, Executive Information Systems, Data Warehouses, Expert Systems, and Neural Networks. The focus in this course is on data and text mining, using an appropriate software application for the organization, retrieval, and modeling of large structured and unstructured data sets.

Prerequisites: MBA 606, MBA 607

### **HCM 648. Health Informatics**

*Winter, On-site; Strang / Summer, Online; Otto*

This course will introduce students to the concepts and practices of health informatics. Topics include: a) an introduction to information systems and specifically to the health informatics field; b) major applications and commercial vendors; c) decision support methods and technologies; d) system analysis, design, implementation, and evaluation of healthcare information systems; and e) new opportunities and emerging trends.

### **HCM 650. Structural Dynamics in Healthcare Systems**

*Fall, On-site; Smith/winter, online; Stephenson*

Application of organization theory to healthcare organizations and systems for the purpose of improving performance. Topics include: organizational structure and design, coordination and control, power and politics, organizational culture, organizational ethics, organizational change.

Prerequisites: HCM 500 and 501.

### **HCM 656. Group Practice Administration**

Seminar and Practicum

*Winter, Online, Summer, On-site; Scimeca*

The objective of this course is to introduce students to the organization and management of private group practice through seminar and practical experience. It is intended that this course will prepare students for employment in private group practices and/or other ambulatory care organizations.

Prerequisites: HCM 500 and 501.

### **HCM 674. Legal Aspects of Healthcare**

*Spring, Online, Summer, On-site; Zambri*

(Cross-listed as LIM 674)

This course is designed to familiarize students with basic legal issues involved in managing healthcare systems. Antitrust, consent, labor law, malpractice, professional rights and other problems are explored using actual and hypothetical case studies. Not open to JD/MBA students.

### **HCM 680. Health Policy and Managerial Epidemiology**

*Spring, On-site; TBA*

(Cross-listed as LIM 670)

This course covers health public policy formulation and implementation and is designed to provide an understanding of the political and regulatory environment of healthcare organizations.

Prerequisites: HCM 500 and 501.

Prerequisites for LIM program: LIM 500 & LIM 503

### **HCM 681. Strategic Issues for Healthcare Organizations (Health Capstone)**

*Spring Pre On-site; Huppertz and Smith*

This course is designed to integrate the concepts and skills associated with managerial problem-solving learned throughout the MBA in Healthcare Management program. Students analyze case studies addressing the strategic realignment of health service organizations in today's healthcare environment. A variety of expert practitioners present their views on this topic. Students must have three or fewer courses left to complete after taking HCM 681.

### **HCM 683. Health Internship**

*No fee; Fall, Winter, Spring, Summer*

### **HCM 684. Strategic Issues for Healthcare Organizations (LIM, Capstone)**

*Summer On-site; Huppertz,*

This course is designed to integrate the concepts and skills associated with managerial

problem-solving learned throughout the graduate healthcare management courses of the joint Union College/Union Graduate College/Albany Medical College 8-year Leadership in Medicine program. Students analyze case studies addressing the strategic realignment of health service organizations in today's healthcare environment. A variety of expert practitioners present their views on this topic.

**HCM 690. Independent Study in Health Systems**

Students pursue programs of independent study in a particular area of health systems under the supervision of a faculty member. Written permission of the Dean is required.

**STA 501. Introduction to Probability and Statistics**

*Winter, On-site; Eno*

This course studies the fundamentals of applied probability, most important distributions, acceptance sampling, confidence intervals, point estimation, and tests of hypotheses.

Open to LIM or MSCL Students

# CENTER FOR BIOETHICS AND CLINICAL LEADERSHIP COURSES

## MS IN BIOETHICS COURSES

### **BIE 500. Proseminar in Health and Human Values**

*Summer (one- week in Summer), On-site, Union Graduate College w/ Clinical Visit to Icahn School of Medicine at Mount Sinai; Baker, Rhodes, Philpott-Jones*

An intensive eight-day introduction to current topics in clinical ethics and bioethics, taught seminar style at Union Graduate College, with a clinical visit to Mount Sinai School of Medicine in New York City. This overview of current issues in bioethics humanities involves four special pro-seminars, case conferences and ethics rounds. There will also be training in the computer skills (demonstrations, workshops) essential to mastering distance learning. Must be taken in the first fifteen months of enrollment.

### **BIE 510. Biomedical Ethics**

*Fall, Online; Schwab*

An advanced historically-based introduction to bioethics and clinical ethics focusing on such formalizations of medical morality as the Hippocratic Oath, the AMA codes, the Belmont Report and Beauchamp and Childress Principles, and the idea of casuistry. Major cases in bioethics will also be reviewed and the evolution of the core concepts and infrastructure of medical ethics and bioethics will be examined.

### **BIE 520. Healthcare Policy**

*Winter, Online; Strosberg*

This course provides an understanding of the public policy-making process and the political and regulatory environment in which healthcare organizations function. It also provides an understanding of managerial processes, politics, and structure of the healthcare organizations where ethical policies and practices are implemented and carried out on an ongoing basis. Policies for consideration include resource allocation, end-of-life decision-making, accountability and performance measurement, and conflict-of-interest.

### **BIE 525 Public Health Ethics**

*(Elective for Clinical Ethics and Research Ethics Specializations, required for Policy specialization)*

*Winter, Online; Bloom*

In this course, students learn about ethics and public health, and the ways in which these two fields interconnect. The course focuses on ethical theory and the discipline and history of public health, using case studies to illustrate the application of ethical theory to public health practice.

### **BIE 530. Bioethics and the Law**

*Spring, Online; Meyer*

This course is designed to familiarize students with major legal issues and legal concepts relevant to bioethics.

**BIE 533. Neuroethics:**

*Spring of alternate years, Online; Gligorov (1/2 course elective)*

The course will aim to familiarize the students with the most pertinent issues in Neuroethics, but will emphasize those issues which have some immediate application in clinical settings, such as criteria for brain death, the ethics of enhancement and justification of memory manipulation. The overall objective of the course is to demonstrate continuity between neuroethics and other areas of bioethics, and to identify the application of major ethical principles to this new branch of ethics.

**BIE 535 - Medicine and Social Justice**

*(Required for Policy Track, elective for clinical Ethics & Research Ethics Tracks)*

*Fall, Online; Rhodes, Kleinman, Mendis*

This course examines issues of social justice in medicine, beginning with a review of classical (Aristotle) and contemporary (Rawls) works on political philosophy, ethics and justice. Students will also read some of theoretical work of authors who focus their attention on justice in medicine (including Daniels and Menzel). Building on these philosophic underpinnings, students will then explore the issues that lie at the heart of justice in medicine: the right to health and healthcare, aggregation and utility, personal responsibility, prioritarianism, and the allocation of medical resources.

**BIE 543- Jewish Bioethics**

*Spring of alternate years, Online; Zohar (1/2 course elective)*

The first part of this course aims to explain the scope and nature of "Jewish Bioethics", presented in the broader context of the Jewish tradition of normative discourse. Employing specific examples with relevance to contemporary bioethical issues, the contours of that tradition will be traced from the Bible through Talmudic and medieval texts to modern works. We will then illustrate the content and workings of Jewish Bioethics through two fields in which its teachings are particularly distinct, related in different ways to the fundamental belief that humans are created in the Divine Image: (a) Beginning of life (including the status of the embryo, assisted reproduction and stem-cells, with a special emphasis on questions of gender) and (b) End of life (including the tradition's powerful emphasis on saving and extending life, the debate over "brain death", and cadaver organ transplantation).

**BIE 545. Reproductive Ethics**

*Summer of alternate years, Online; 6 weeks, full master's credits; elective for all specializations Steinbock (elective)*

An investigation of the ethical and legal problems associated with new reproductive technologies and genetics.

**BIE 555. Research Ethics**

*(elective for Clinical Ethics track, Required for Research Ethics track)*

*Fall: Online: Gligorov*



Analyze individual cases, make informed and reasoned judgments about the proper conduct of research, develop the skills and knowledge base essential to designing and developing education in, and professional awareness of, research ethics.

**BIE 563 Pediatric Ethics:**

*Spring of alternate years, Online; Cummins (1/2 course elective)*

In this course we will cover standards for surrogate decision making for children; ethical issues with respect to very premature neonates; withholding and withdrawing life-sustaining care; genetic testing and screening; and adolescent confidentiality, truth-telling, and decision making. This course will include guest participation by members of the Icahn School of Medicine faculty, including experts in neonatology, adolescent health, genetics, and pediatric oncology.

**BIE 566. Foundations of Empirical Bioethics**

*Fall, Online: Oppenlander (1/2 course)*

This course covers the basic process and methods encountered in conducting empirical research in bioethics. A key objective is to develop an understanding of commonly encountered study designs and statistical methods needed to understand published empirical literature in bioethics and healthcare. The course focuses on developing skills to critically evaluate the quality and applicability of empirical research studies. Foundations of Empirical Bioethics course is targeted for those students with limited background in statistics.

**BIE 567. Survey Research Methods**

*Fall, Online, Oppenlander (1/2 course)*

This course will cover the survey research process including planning, design, execution, and analysis. Careful construction of questions is essential to eliciting information from human subjects that will meet the objectives of research studies. Good practices in questionnaire construction and survey execution that will lead to the efficient collection of high quality data are covered. The course will focus on the practical aspects of survey research by developing and executing various types of data collection instruments and analyzing the resulting data.

**BIE 568. Empirical Methods in Healthcare Policy**

*Fall, Online, Oppenlander (1/2 course)*

This course is intended for those students that have prior background in reading empirical literature or in conducting empirical research. Methods will be presented that are more advanced than those found in standard undergraduate statistics courses.

**BIE 569. Statistical Methods in Healthcare**

*Fall of alternate years, Online; Oppenlander (1/2 course)*

The purpose of this course is to cover statistical topics applicable to healthcare settings, not typically covered in an introductory statistics course. These topics include study designs commonly applied in healthcare, measures of disease frequency and health risk, power analysis, and non-parametric statistics.

**BIE 570 –Bioethics Policy: Foundations:**

*(Elective for Clinical Ethics and Research Ethics Specializations, required for Policy specialization)*

*Fall, Online, Meyer*

This course will address *prospective rules* designed to govern *populations* and *categories of cases*. Often, bioethics policies have the force of law (e.g., statute, agency regulation, court precedent); at other times, however, they are voluntarily adopted by institutions or groups (e.g., hospitals, insurers, IRBs, research funders, the AMA).

This course focuses on the moral philosophical and behavioral foundations of contemporary bioethics policy and draws on concepts from philosophy, economics, and psychology that are increasingly used in policymaking in both the U.S. and the U.K.

**BIE 573 - Interpersonal Skills and Communication:**

*Spring of alternate years, Online (1/2 Course, elective)*

**BIE 575 - Bioethical Issues at the End of Life:**

*Summer of alternate years, Online, (6 weeks; full master's credits, elective for all Specializations) Steinbock*

**BIE 580. Research Ethics II**

*(required for Research Ethics Track, elective for Clinical Ethics and Policy track)*

*Winter, Online, Philpott-Jones*

Teaches students about the ethics and policies governing scientific research, particularly research involving human participants or animal subjects. This course builds upon the knowledge and themes introduced in BIE-555 (Research Ethics I). Research Ethics II covers these topics in greater depth and explores the key US and international laws and policies that regulate the design, conduct, and oversight of trials involving human participants or animal subjects. In addition, students examine in-depth specific areas or types of biomedical research that are potentially controversial or ethically problematic. Required for research ethics track, elective for clinical ethics track

Prerequisites: BIE 555

**BIE 590. Clinical Ethics**

*(required for Clinical Ethics Track, elective for Research Ethics and Policy track)*

*Fall, Online; Gligorov, Icahn School of Medicine at Mount Sinai staff*

This course deals with the practical applications of clinical ethics, including clinical ethics consulting and its recording and documentation, the work of ethics committees and IRBs, and other practical ethics of clinical ethics.

**BIE 610C. Online Practicum in Clinical Ethics**

*Winter, Online; TBD*

A supervised practical experience in clinical ethics designed to teach skills of clinical ethics consultation.

Prerequisite: BIE 590.

**BIE 610P. Online Practicum in Policy**

*Winter, Online; Meyer*

This course is designed as an opportunity for students to develop and refine the skills of policy analysis that they have learned in prior courses — in particular, in the prerequisites to this course — and to apply them to a range of current issues in bioethics policy. To be as relevant as possible to students with diverse interests and career aspirations in bioethics, the course covers a broad range of policy issues in the biosciences, including both public and “private” bioethics policies. (online, Spring)

**BIE610R. Online Practicum in Research Ethics**

*Spring, Online; Philpott-Jones*

A supervised practical experience in research ethics designed to teach specific skills. Exposes students to the process of ethical review of research involving human volunteers or animal subjects, and helps students develop some of the basic skills that a working research ethics professional needs. Through online discussion and participatory exercises, students gain a practical understanding of: (a) research ethics committee structure and function, (b) applicable state and federal regulations regarding the conduct of research involving human volunteers or animal subjects, and (c) relevant organizational and management skills needed to lead a research ethics committee. In addition, students are taught practical skills in qualitative and quantitative research, report and grant writing, and bioethical training and education.

Prerequisite: BIE 580.

**BIE 620C. On-Site Practicum in Clinical Ethics**

*Spring, On-site, Icahn School of Medicine at Mount Sinai*

A supervised practical experience in clinical ethics designed to teach skills in clinical ethics consultation. (One week during Spring Term)

Prerequisite: BIE 590. Co-Req with BIE 610C

**BIE 620R. On-Site Practicum in Research Ethics**

*Spring, On-site, Icahn School of Medicine at Mount Sinai*

A supervised practical experience. Helps students develop and refine the practical skills introduced in BIE 610R (Online Research Ethics Practicum) through hands-on experience. These skills include: teaching and education, review and oversight of institutional research projects involving human volunteers or animal subjects, and sound management of the research endeavor, including organizational management and policy analysis, arbitration, and mediation (One week during Spring Term)

Prerequisite: BIE 580. Co-Req with BIE 610R

**BIE 630 & BIE 640. Masters Project I & II**

*Fall and Winter, Online; Bloom & Individual faculty supervisors*

The masters project in bioethics or clinical ethics, will involve two terms of research culminating in a written document addressing some aspect of clinical ethics or bioethical policy, such as a proposal to revise or reform practices at a medical institution or managed care organization, or a proposal to change bioethical policy.

**BIE 650. Capstone (All Specializations)**

*Spring, On-site, Union Graduate College*

Capstone practicum in which students demonstrate their mastery of clinical ethics or research ethics. Each student presents their Masters Project. (One week during Spring Term)

## **MS IN CLINICAL LEADERSHIP COURSES**

### **LIM 500. Introduction to Health Systems**

*Fall; TBD*

This course examines the determinants of health, illness, and medical care utilization, institutional arrangements and settings for the delivery of acute and chronic care, the doctor-patient relationship, resource allocation, and the measuring and evaluating system performance.

### **LIM 503. Healthcare Leadership**

*Winter; Strosberg*

This course examines managerial roles and processes within health service organizations - organization design, managerial epidemiology, governance, total quality management, human resource management, labor relations and ethics.

Prerequisite: LIM 500.

### **LIM 544. Health and Human Values**

*Summer (one-week in summer), Union Graduate College; Baker, Philpott-Jones*

The seminar in Health & Human Values) is an intensive one-week introduction to current topics in clinical ethics and bioethics. The course is taught seminar style at Union Graduate College. Students are given an overview of current issues in bioethics.

### **LIM 553. Economics of Health**

*Spring; Chang*

Examination of demand and supply for medical personnel; analysis of hospital cost, inflation, and health insurance. Discussion of issues in cost benefit analysis of public health and regulation of healthcare markets.

### **LIM 571. Clinical Leadership Practicum**

*Spring; Strosberg*

(Cross-listed as HCM 571)

Students will work in the field with a preceptor in a clinical leadership role. Students may be placed in a variety of healthcare settings including: hospitals, physician offices, health maintenance organizations, etc. Classes meet every other week to discuss students' field experiences and selected readings.

### **LIM 674. Legal Aspects of Healthcare**

Summer (Cross-listed as HCM 674)

This course is designed to familiarize students with basic legal issues involved in managing healthcare systems. Antitrust, consent, labor law, malpractice, professional rights and other problems are explored using actual and hypothetical case studies. Not open to JD/MBA students.

**LIM 680. Health Policy and Managerial Epidemiology**

Summer (Cross-listed as HCM 680)

This course covers two main topics. The first (focusing on public policy formulation and implementation) is designed to provide an understanding of the political and regulatory environment of healthcare organizations. The second focuses on understanding and applying basic epidemiological methodologies to the healthcare management arena.

Prerequisites: HCM 500 and 501.