Masters of Engineering (M.Eng.)

In an effort to meet increasing industry demands for highly skilled workers, the School of Engineering offers a professional Master of Engineering program with a variety of concentrations. The following concentrations are designed to benefit working professionals who seek to increase their qualifications:

- ASEM: Advanced Safety Engineering and Management
- CECM: Construction Engineering Management
- CESC: Sustainable Smart Cities
- CESE: Structural Engineering
- IEM: Information Engineering Management

UAB, a world-class, regionally accredited (SACSCOC) university, provides a wide-ranging fully online engineering program with five distinct, in-demand concentrations designed for working professionals. All courses are comprised of real-world, practical knowledge and content to help our graduates advance in their careers.

All Master of Engineering concentrations are 100% online and are comprised of real-world, practical knowledge and content to help our graduates advance in their careers. There are no campus classes or required on-campus meetings or activities. Course delivery includes asynchronous and synchronous learning modes. Students are provided 24/7 support throughout the program.

Advanced Safety Engineering and Management Concentration

Please Note: All Master of Engineering concentrations are 100% online. There are no campus classes or required on-campus meetings or activities. Course delivery includes asynchronous and synchronous learning modes.

Degree Offered	Master of Engineering
Website	http://www.uab.edu/asem
Director	Donald S. Burke, PhD
Email	dburke3@uab.edu
Phone	205-975-3891
Address	UAB School of Engineering, HOEN 370
	1720 2nd Avenue South, Birmingham, AL 35294-4440

The Master of Engineering with a concentration in Advanced Safety Engineering and Management is designed for students to explore injury and catastrophe prevention through a different paradigm. Through a “Prevention through Design” approach, ASEM students examine error-provocative environments as a means to design away risk. By teaching students both the language of engineering as well as safety concepts, graduates are able to bridge the divide between design engineers and occupational safety and health professionals.

Admission Requirements

In addition to the Graduate School admission requirements, admission to the UAB MEng-ASEM program includes the following:

1. Undergraduate degree from a regionally-accredited school
2. Experience in safety or a related field
3. Three letters of recommendation from professional contacts which speak to your character, work ethic, and why the writer believes you will succeed in graduate school
4. Personal essay detailing motivation for earning the degree
5. Résumé/CV
6. NO GRE REQUIRED
7. International applicants must submit English proficiency scores in accordance with UAB Graduate School requirement. Click here for details

Applicants not holding a degree from a regionally accredited school may receive admission with contingencies, subject to assessment and recommendation of the program director.

To apply, visit the UAB Graduate School website.

Application Deadlines	Fall: August 1; Spring: December 1; Summer: May 1
Deadline for All Application Materials to be in the Graduate School Office	Fall: August 1; Spring: December 1; Summer: May 1

The MEng-ASEM graduate program is taught by a team of practicing safety and health professionals and engineers with Dr. Donald Burke serving as Program Director. Practitioner-Scholars facilitate online discussions on key topics of interest in their industry sector and provide industry-specific case studies. Students participate in peer-to-peer learning activities discussing current issues in the safety profession and real world experiences using online discussion boards.

Master of Engineering with a concentration in Advanced Safety Engineering and Management

Students must earn a B or better in two attempts to meet graduation requirements.

Requirements		Hours
Required Courses		
ASEM 601	ASEM Seminar [1]	0
ASEM 610	Introduction to System Safety - Prevention through Design	3
ASEM 619	Capstone Project - Part 1	3
ASEM 620	Capstone Project - Part 2	3
Electives		**24**
ASEM 611	Hazard Analysis and Waste Elimination	
ASEM 612	Engineering Risk	
ASEM 613	Human Performance and Engineering Design	
ASEM 614	Engineering Ethics and Acceptable Risk	
ASEM 615	Leading through Climates of Change	
ASEM 616	Policy Issues in Prevention through Design	
ASEM 617	Crisis Leadership	
ASEM 626	Learning-Based Response to Organizational Accidents and Incidents	

ASEM 627	Communication in Safety Systems	
ASEM 628	Electrical Systems Safety	
ASEM 630	Machinery Safety Managment System	
ASEM 690	Special Topics in (Area) [2]	
ASEM 691	Individual Study in (Area) [2]	
Total Hours		**33**

[1] Must be taken each semester
[2] With Director approval; no more than 6 combined credit hours of ASEM 690 and ASEM 691 may be applied to the degree

Coordinated ASEM/MBA Program

The UAB School of Engineering and the Collat School of Business have partnered to offer a coordinated Advanced Safety Engineering Management/MBA degree.

Application Process

Students interested in pursuing the dual ASEM/MBA degree must complete a separate MBA application through the UAB Graduate School's application system. Deadline for applications will be as follows:

Required Documents

Completed application including:

- Résumé/CV
- Statement of purpose
- Three letters of recommendation from professional contacts[1]
- Transcripts from all colleges and universities attended[2]
- The TOEFL and GMAT requirement will be waived for applicants admitted to the ASEM program.

[1] Students may use the same references as used for ASEM application.
[2] Transcripts submitted for the ASEM application are sufficient.

Degree Requirements

Students will have 5 years from term of entry to complete the degree. Courses older than 5 years may be used towards the degree if revalidated by the Graduate School of Management. The MBA degree consists of 12 required courses (36 semester hours). Six hours of elective credit will be waived with completion of comparable courses in the ASEM program.

The curriculum for the MBA degree as part of the dual ASEM/MBA degree is:

Requirements		Hours
MBA 601	Accounting and Finance for Managers	3
MBA 662	Quantitative Analysis for Business Managers	3
MBA 631	Management and Organizations	3
MBA 642	Economics for Managers	3
Functional Core		15
MBA 608	Strategic Cost Analysis and Decision Making	
MBA 619	Information Technology and Business Strategy	
MBA 621	Topics in Corporate Finance	
MBA 637	Operations and Supply Chain Management	
MBA 651	Marketing Strategy	
Capstone		3
MBA 634	Strategic Management	
Electives (completed with ASEM)		6
Total Hours		**36**

Completion of Degree

Students must file an application for degree with the MBA advising office during the term preceding their final semester. The MBA degree will be awarded at the completion of the ASEM and MBA degree requirements.

Construction Engineering Management Concentration

Please Note: All Master of Engineering concentrations are 100% online. There are no on-campus classes or required on-campus meetings or activities. Course delivery includes asynchronous and synchronous learning modes. Proper computer equipment and high-speed internet direct access are required to be successful.

Degree Offered	Master of Engineering
Website	http://www.uab.edu/engineering/cem
Director	Wesley Zech, PhD, LEED AP
Email	zechwes@uab.edu
Director of CEM Student Affairs	Dianne Gilmer, MEng, PMP
Email	digilmer@uab.edu
Phone	205-975-5848
Address	UAB School of Engineering, HOEN 130B
	1720 2nd Avenue South, Birmingham, AL 35294-4440

The Master of Engineering with a concentration in Construction Engineering Management (MEng-CEM) is designed to enhance the construction engineering management and business qualifications of working professionals interested in project and company/corporate management.

Admission Requirements

In addition to the Graduate School admission requirements, admission to the UAB MEng-CEM includes the following:

1. **Bachelor's degree** (any discipline) from a regionally accredited US college or university. CEM promotes a multi-discipline learning experience and therefore an engineering undergraduate degree is not required;
2. An **undergraduate GPA** of 3.0 or higher (individuals not meeting this requirement but who have a strong professional background, references, and interview may be admitted);
3. **No GRE required**;
4. International applicants must submit **English proficiency scores** in accordance with UAB Graduate School requirement. Click here for details;
5. **Original transcripts** sent directly to the UAB Graduate School per their policy for degree-seeking students (detailed instructions are included during the online application process);
6. Two years of **relevant construction industry work experience** or a bachelor's degree in engineering or a science-related field;

7. **Personal interview** with the Director of CEM Student Affairs (schedule the interview prior to submitting a application);
8. Three **letters of recommendation** from professional contacts;
9. **Personal essay** detailing motivation and career aspirations for earning the degree; and
10. **Résumé/Curriculum Vitae**

To apply: Visit the UAB Graduate School website and click the 'Apply Now' button. Choose MEng - Construction Engineering Management in the *Program Applying To* section.

Pre-Defined Table

Deadline for Entry Term(s)	Fall: August 1; Spring: December 1; Summer: May 1
Deadline for All Application Materials to be in the Graduate School Office	Seven business days before term begins (see https://www.uab.edu/students/academics/academic-calendar)

Requirements		Hours
CECM 669	Advanced Project Management	3
CECM 670	Construction Estimating and Bidding	3
CECM 671	Construction Liability & Contracts	3
CECM 672	Construction Methods and Equipment	3
CECM 673	Project Planning and Control	3
CECM 674	Green Building Design/Construction	3
CECM 675	Advanced Construction and Engineering Economics	3
CECM 676	Construction Project Risk Management	3
CECM 688	Construction Management and Leadership Challenges in the Global Environment	3
CECM 689	Building Information Modeling (BIM) Techniques	3
Total Hours		**30**

Sustainable Smart Cities Concentration

Please Note: All Master of Engineering concentrations are 100% online. There are no on-campus classes or required on-campus meetings or activities. Course delivery includes asynchronous and synchronous learning modes. Proper computer equipment and high-speed internet direct access are required to be successful.

Degree Offered	Master of Engineering
Website	http://www.uab.edu/engineering/
Director	Jason T. Kirby, PhD
E-mail	jtkirby@uab.edu
Phone	205-934-8479
Address	UAB School of Engineering, HOEN 340
	1720 2nd Avenue South, Birmingham, AL 35294-4440

Admission Requirements

In addition to the Graduate School admission requirements, requirements for admission to the UAB MEng-SSC program includes the following:

1. **Bachelor's degree** (any discipline) from a regionally accredited US college or university. SSC promotes a multi-discipline learning experience and therefore an engineering undergraduate degree is not required;
2. An **undergraduate GPA** of 3.0 or higher (individuals not meeting this requirement but who have a strong professional background, references, and interview may be admitted);
3. **No GRE required**
4. International applicants must submit **English proficiency scores** in accordance with UAB Graduate School requirement. Click here for details;
5. **Original transcripts** sent directly to the UAB Graduate School per their policy for degree-seeking students (detailed instructions are included during the online application process);
6. Two years of **relevant construction industry work experience** or a bachelor's degree in engineering or a science-related field;
7. **Personal interview** with the Director of SSC (schedule the interview prior to submitting a application);
8. Three **letters of recommendation** from professional contacts;
9. **Personal essay** detailing academic motivation and and career aspirations in SSC; and
10. **Résumé/Curriculum Vitae**

Application Submission Deadline for Entry Term(s)	Fall: August 1; Spring: December 1; Summer: May 1
Deadline for All Application Materials to be in the Graduate School Office	Seven business days before term begins (see UAB academic calendar - https://www.uab.edu/students/academics/academic-calendar)

Requirements		Hours
CESC 600	Principles of Sustainable Development	3
CESC 602	Introduction to Sustainable Smart Cities	3
CESC 604	Low-Carbon and Renewable Energy Systems for Smart Cities	3
CESC 606	Managing Natural Resources and Sustainable Smart Cities	3
CESC 608	Green Infrastructure and Transportation	3
CESC 610	Health and Liveability	3
CESC 612	Green Buildings	3
CESC 614	Smart Cities Technologies	3
CESC 616	Big Data and Smart Cities	3
CESC 618	Research Methods and Project Planning	3
CESC 620	Sustainable Smart Cities Research Project	0
Total Hours		**30**

Structural Engineering Concentration

Please Note: All Master of Engineering concentrations are 100% online. There are no on-campus classes or required on-campus meetings or activities. Course delivery includes asynchronous and synchronous learning modes. Proper computer equipment and high-speed internet direct access are required to be successful.

Degree Offered	Master of Engineering
Website	http://www.uab.edu/engineering/
Director	Christopher Waldron, PhD, PE
E-mail	cwaldron@uab.edu
Phone	205-934-8435
Address	UAB School of Engineering, HOEN 130B

1720 2nd Avenue South,
Birmingham, AL 35294-4440

The Master of Engineering with a concentration in Structural Engineering is designed to increase the technical knowledge of engineering professionals working in or desiring to work in the broad field of structural engineering.

Admission Requirements

In addition to the Graduate School admission requirements, requirements for admission to the UAB MEng-STR program include the following:

1. An **undergraduate degree** in civil or mechanical engineering from an ABET accredited program. Applicants who have a Bachelor's degree and an outstanding academic record from an ABET accredited program other than civil or mechanical engineering or from an unaccredited engineering or applied science program may be admitted at program discretion;
2. An **undergraduate GPA** of 3.0 or higher (individuals not meeting this requirement but who have a strong professional background, references, and interview may be admitted);
3. **No GRE required**;
4. International applicants must submit **English proficiency scores** in accordance with UAB Graduate School requirement. Click here for details;
5. **Original transcripts** sent directly to the UAB Graduate School per their policy for degree-seeking students (detailed instructions are included during the online application process);
6. Minimum undergraduate prerequisites or equivalent (students missing undergraduate prerequisites may be admitted but will be restricted from taking certain courses until the needed prerequisites are satisfied:
    a. Structural Analysis of Elastic Structures
    b. Reinforced Concrete Design
    c. Principles of Steel Design
7. **Personal interview** with the program director (schedule the interview prior to submitting a application);
8. Three **letters of recommendation** from professional contacts;
9. **Personal essay** detailing academic motivation and and career aspirations for earning the degree; and
10. **Résumé/Curriculum Vitae**

To apply: Visit the UAB Graduate School website and click the 'Apply Now' button. Choose MEng - Construction Engineering Management in the *Program Applying To* section.

Application Submission Deadline for Entry Term(s)	Fall: August 1; Spring: December 1; Summer: May 1
Deadline for All Application Materials to be in the Graduate School Office	Seven business days before term begins (see UAB academic calendar - https://www.uab.edu/students/academic-calendar)

Requirements		Hours
Select a minimum of 21 hours [1]		**21-30**
CESE 653	Wood and Masonry Design	
CESE 656	Advanced Mechanics of Materials for Structural Engineering	
CESE 657	Advanced Design of Steel Structures	
CESE 659	Advanced Reinforced Concrete	
CESE 660	Prestressed Concrete Behavior and Design	
CESE 662	Advanced Structural Analysis	
CESE 664	Bridge Engineering	
CESE 665	Structural Dynamics and Earthquake Engineering	
CESE 676	Design of Structural Steel Connections	
CESE 690	Special Topics (Area)	
Select a maximum of 9 hours [1]		**0-9**
CECM 669	Advanced Project Management	
CECM 671	Construction Liability & Contracts	
CECM 673	Project Planning and Control	
CECM 674	Green Building Design/Construction	
CECM 675	Advanced Construction and Engineering Economics	
CECM 676	Construction Project Risk Management	
CECM 689	Building Information Modeling (BIM) Techniques	

[1] Up to 12 hours of CE course offerings can be substituted for CESE or CECM courses with prior approval from the Program Director

Curriculum

Requirements	Hours
Students must complete a minimum of 30 hours with the classes listed below	**30**
All CESE courses at the 600 level	
All CECM courses with advisor-approval 600-791 (maximum of 9 hours)	
All CE courses with advisor-approval 500-791 (maximum of 12 hours)	
Total Hours	**30**

Information Engineering Management Concentration

Please Note: All Master of Engineering concentrations are 100% online. There are no campus classes or required on-campus meetings or activities. Course delivery includes asynchronous and synchronous learning modes.

Degree Offered	Master of Engineering
Website	http://www.uab.edu/iem
Director	Dale W. Callahan, PhD, PE
Email	iem@uab.edu
Phone	(205) 934-8480
Address	UAB School of Engineering, HOEN 370
	1720 2nd Avenue South, Birmingham, AL 35294-4440

Admission Requirements

In addition to the Graduate School admission requirements, admission to the UAB MEng-IEM program includes the following:

1. An undergraduate degree from a regionally accredited university: preference is given to engineering, math, science or technical-related undergraduate degrees
2. Official transcripts from every college/university attended
3. Résumé/CV showing relevant industry work experience
4. Three letters of recommendation from professional contacts

5. An essay answering the questions listed on the IEM website Apply Now page
6. An interview with the IEM admissions committee
7. No GMAT/GRE required for admission to IEM
8. International applicants must submit English proficiency scores in accordance with UAB Graduate School requirement. Click here for details

To Apply:

Visit the UAB Graduate School website and click the 'Apply Now' button to complete an application.

Application Submission Deadline for Entry Term(s)	Fall: August 1; Spring: December 1; Summer: April 15
Deadline for All Application Materials to be in the Graduate School Office	Six weeks before term begins (see UAB academic calendar - https://www.uab.edu/students/academics/academic-calendar)

Late Applicants

Applicants who miss the Graduate School's deadline for admission may apply as "non-degree seeking" and pay an additional application fee. Late applicants are still required to submit the paperwork outlined above. The non-degree seeking deadline is typically 2-4 weeks before classes begin.

Curriculum

Requirements		Hours
IEM 601	Introduction to IEM	1
IEM 602	Leading Collaborative Teams	1
IEM 603	Communication for Technology Executives	1
IEM 610	Communication for Technology Professionals	3
IEM 611	Leading Technical Organizations	3
IEM 612	Project Leadership	3
IEM 620	Technical Entrepreneurship	3
IEM 625	Technology and Innovation	3
IEM 630	Systems Engineering	3
IEM 631	Operational Decision-Making	3
IEM 645	Financial Concepts for Entrepreneurs	3
IEM 646	Strategic Planning	3
IEM 695	IEM Design Project	3
Total Hours		**33**

ASEM-Adv Safety Engineering Courses

ASEM 601. ASEM Seminar. 0 Hours.
Seminar focusing on student research and guest presentations of various topics of interest to safety and risk management engineers and safety professionals.

ASEM 610. Introduction to System Safety - Prevention through Design. 3 Hours.
Best practice in any business sector requires the pursuit of a triple bottom line - protecting people, planet, and profit. This course provides an overview of system safety in general and Prevention through Design in particular and explores their efficacy in helping companies achieve a bottom line that is socially, environmentally, and financially rewarding. Topics of inquiry include the processes of hazard analysis and risk assessment, the concept of "acceptable" risk, the safety decision hierarchy of controls, safety standards (the mandatory minimum vs. the voluntary best practice), safety as a cost control strategy, and the critical elements of a comprehensive, advanced safety program. Course content is presented within the framework of real-world case studies from a variety of industry sectors, including, but not limited to, manufacturing, utilities, and health care and includes several guest lectures by leaders in the profession. Students apply course content to their own business environment. Guest lecturers from diverse backgrounds will discuss their experiences in managing safety in the workplace. Live participation in a weekly 1.5 hour online forum is required. Course must be taken during the first semester.

ASEM 611. Hazard Analysis and Waste Elimination. 3 Hours.
Hazards have the potential to cause harm to people, planet, and profits. Hazard analysis is a process that begins with the identification of a hazard and proceeds into an estimate of the severity of harm or damage that could result if the potential is realized and a hazard-related incident occurs (ASSE TR-Z790.001 – 2009). This course examines engineering techniques utilized to systematically and logically identify and analyze hazards in the workplace. These techniques include preliminary hazard list (PHL), preliminary hazard analysis (PHA), system hazard analysis (SHA), subsystem hazard analysis (SSHA) and others. Students work in teams to use these techniques to retrospectively analyze a real-world disaster.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 612. Engineering Risk. 3 Hours.
Engineering risk is defined both quantitatively and qualitatively as an estimate of the probability that a hazard-related incident will occur and of the severity of harm or damage that could result. This course provides students with tools to assess and reduce safety risks in their own company. These tools include risk assessment matrices, probabilistic risk assessment (PRA) measures, including event tree analysis, fault tree analysis, and other prevention through design concepts. The role of a structured, formalized decision analysis process in preventing serious injuries and fatalities is also explored. Students engage in a risk mitigation decision analysis project, which is specific to their company and/or business sector. Guest lecturers from diverse industries discuss their experiences in assessing and managing risk. Live participation in a weekly 1.5 hour online forum is required.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 613. Human Performance and Engineering Design. 3 Hours.
Companies can miss important opportunities to eliminate waste if they rely primarily on training to prevent human error. This course explores the historical perspective on human error and serious injury. The course material will provide a solid understanding of the principles of occupational biomechanics and human tolerance to injury with focus on human anthropometry and mechanical work capacity. This course also includes studies of human reliability, static analysis of systems in equilibrium and mechanical systems, design and performance. Due to the quantity of back related injuries and related lost time in the workplace, back pain and injury is studied along with the effect of vibration on the human body. Real-world case studies provide for application of the engineering hierarchy of controls: hazard elimination, hazard substitution, engineering controls, warnings, administrative behavior controls, and personal protective equipment. The course also examines the design aspects of ergonomics, the biomechanical engineering basis of injury prevention, and the long term economic consequences of seemingly minor injuries. In semester projects, students perform incident investigations using biomechanical and other data. After gathering and analyzing data to determine injury causation, they will identify and re-design error-provocative environments in their own workplaces. Guest lecturers from diverse backgrounds will discuss their experiences with human performance and/or biomechanics. Live participation in a weekly 1.5 hour online forum is required.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 614. Engineering Ethics and Acceptable Risk. 3 Hours.
This course explores the economic, social, and political consequences of safety risk and considers provocative real world dilemmas: What is acceptable risk? Are the fundamental canons of engineering ethics contrary to the concept of acceptable risk? What is the worth of human life? Students will conduct critical reviews of corporate safety and ethics policies from market leaders in all major industries as well as their own company. Real-world case studies provide the framework for exercises in resolving conflicts of interest and avoiding the dilemma of "whistle blowing." Guest lecturers from diverse backgrounds will discuss their experiences with ethics in the workplace. Live participation in a weekly 1.5 hour online forum is required.
Prerequisites: ASEM 610 [Min Grade: B](Can be taken Concurrently)

ASEM 615. Leading through Climates of Change. 3 Hours.
All progressive companies are moving toward greater sustainability - protecting people, planet, and profits. To guide their companies through these changes and integrate safety into the priorities at the executive level, safety engineers and professionals must have strong leadership skills. This course explores engineering leadership best practices, including the eight steps of transformational leadership - creating a sense of urgency, creating a guiding coalition, developing a vision and strategies, communicating the vision, empowering broad-based action, generating short term wins, consolidating gains and anchoring the culture. This course also explores the concept of Resilience Engineering and helps students understand the impacts of socio-technical risks. Guest lecturers from diverse industries discuss their experiences in managing change in today's global business environment. Live participation in a weekly 1.5 hour online forum is required.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 616. Policy Issues in Prevention through Design. 3 Hours.
This course provides an overview of best practices in four major policy areas: (1) cost-benefit analysis; (2) corporate culture and the "HR Department"; (3) standards, codes, and regulations; and (4) strategic alliance development. Case studies are used to illuminate both the role of engineers and other safety professionals in shaping public policy on the local, national and international levels and the ethical challenges they encounter. The significance of an organization's corporate culture in developing and implementing advanced safety management plans is also explored. Students conduct "gap analyses" of their company's policies by comparing them to best practices and identifying unintended consequences of poor safety policy in their own business and industry sector. Students will engage in discussion board posts on contemporary policy issues and participate in exercises related to federal rulemaking. Guest lecturers from diverse backgrounds will discuss their experiences with policy issues. Live participation in a weekly 1.5 hour online forum is required.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 617. Crisis Leadership. 3 Hours.
Leadership requires more than the predication, control, and management of the vast network of influences that make up our work, especially in times of crisis. By its nature, a crisis is an unpredicted event that requires sensemaking and innovation to go beyond immediate recovery, to step forward into learning. We can only do this when we value, trust, and communicate with the people in our systems. This course will explore why complex adaptive systems are different and may be understood and influenced by leadership at all levels before, during, or after a crisis. Students will assess their own organizational culture through the artifacts, espoused values, and deep assumptions and learn to shape these through relationships, sensemaking, and divergent thinking. This course includes two-week long learning modules based on a combination of written discussion boards that emphasize academic rigor, small group dialogues, network mindmapping, and dynamic online Zoom classes with the professors.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 619. Capstone Project - Part 1. 3 Hours.
Bringing to bear the competencies acquired through the program, students develop a proposal, outline, schedule and rough draft of a comprehensive, advanced safety engineering and management plan for their business unit/specialty area that is consistent with the ANSI/AIHA Z10-2005, Occupational Health and Safety Management Systems standard. Judicious selection of the Capstone topic and of projects throughout the ASEM curriculum allows students to build on and use earlier course products to support their Capstone report. Live participation in a quarterly 1.25 hour online forum is required. Must be taken during the penultimate or final semester.
Prerequisites: ASEM 610 [Min Grade: B] and ASEM 611 [Min Grade: B] and ASEM 612 [Min Grade: B] and ASEM 613 [Min Grade: B] and ASEM 614 [Min Grade: B] and ASEM 615 [Min Grade: B] and ASEM 616 [Min Grade: B] and ASEM 617 [Min Grade: B] and ASEM 618 [Min Grade: B] and ASEM 628 [Min Grade: B](Can be taken Concurrently)

ASEM 620. Capstone Project - Part 2. 3 Hours.
Students complete the development of their comprehensive, advanced safety engineering and management (ASEM) plan, including background information of the project, an ASEM plan (management and employee participation, planning, implementation and operation, evaluation and corrective action and management review), and rollout strategy. Students must submit completed report with detailed attachments, and orally present project highlights to the class in a live online classroom setting. Live participation in a quarterly 1.25 hour online forum is required.
Prerequisites: ASEM 610 [Min Grade: B] and ASEM 611 [Min Grade: B] and ASEM 612 [Min Grade: B] and ASEM 613 [Min Grade: B] and ASEM 614 [Min Grade: B] and ASEM 615 [Min Grade: B] and ASEM 616 [Min Grade: B] and ASEM 617 [Min Grade: B] and ASEM 618 [Min Grade: B] and ASEM 628 [Min Grade: B](Can be taken Concurrently)

ASEM 626. Learning-Based Response to Organizational Accidents and Incidents. 3 Hours.
Accident investigations are an inevitable part of most industries, yet most analysis is based on models that were developed many decades – or even a century ago. In our current world, not everything fits into a specific model – this is especially true of human factors in complex systems. Current research indicates that 80% of accidents are attributed to human error. Yet few tools or processes are designed to make sense of the human contribution to accidents and incidents. When we look at human involvement, we find that actions and decisions are consequences of conditions extant in the system, and are not, themselves, causes of the event. The goal of this course is to discover the importance of dedicating time and resources to understanding why humans are integral to complex systems. Students will benefit from learning both the theory and practical application of accident/incident analysis, including new ideas that expand the ability of organizations to learn from events. Approached examined or introduces are consistent with modern advances in event learning and accident prevention. Students will explore the history of accident investigation, it's influence on culture, the importance of context in the evaluation of human actions, the inclusion of complex narratives in reports, and how to present their findings to leadership and the field. Overall, students should come away with a more practical ability to help their organization learn from events. The course structure is focused on case study analysis, peer to peer learning and research. Questions are designed to challenge current understanding of the human contribution to accidents and why actions or decisions made sense to those involved at the time.

ASEM 627. Communication in Safety Systems. 3 Hours.
Communication plays a powerful role in creating safety in the work environment. Effective language increases communication and can lead to individual and organizational learning during safety training, real-time work, and post-mission analysis. However, the meaning of our language is not constant – it changes based on the experience of the worker, the context of the event, and the culture that surrounds the work environment. Language can become ineffective, or even damaging, when meanings differ or go unchallenged. This can occur when definitions are assumed, linguistic shortcuts are taken, or when language bias demands a singular interpretation. Engineers work with mechanical systems, which can be defined by a specific language: e.g. binary oppositions, like turning a switch 'on' or 'off'. However, engineers also work with other people and must take human factors into account, including effective communication. This is the case with safety specialists, who help create the system architecture and develop practical training for workers in risk and safety. These specialists may be expected to participate in accident investigations or incident reviews, which can be unintentionally biased by the language used, which lead away from learning opportunities.

ASEM 628. Electrical Systems Safety. 3 Hours.
There is a subset of occupational hazards characterized as low frequency, but with very high consequence (potential for catastrophic loss, fatality or permanent disabling injury). A mishap involving unintentional exposure or contact with electrical energy is one of the low frequency/high consequence exposures. We live in an electrical world, with electrical hazards embedded in nearly every aspect of daily living – at home, at work, in public places, and in recreational activities. This course explores hazards, risks and context of electrical mishaps coupled with a systems safety engineering approach to manage the risks. Course content is presented within the framework of real-world case studies from a variety of industry sectors, including, but not limited to, manufacturing, utilities, and health care and includes several guest lectures by leaders in the profession. Students apply course content to their own business environment. Live participation in a weekly 1.5 hour online forum is required.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 630. Machinery Safety Managment System. 3 Hours.
Safeguarding technology and requirements have come a long way since the Industrial Revolution. Despite this progress, the lack of machine guarding has continuously been named on OSHA'S top most-cited violations. The goal of this course is to equip the student with working knowledge of machinery safety and to develop an ANSI Z10 safety management system so that safety is incorporated into the equipment lifecycle. Students will evaluate their current machine management systems to evaluate obstacles, best practices, and solutions to further gain knowledge in machinery technology and management. Students will gain an understanding of hazard identification, task-based risk assessment, utilizing the hierarchy of control to select risk reduction measures, verifying selected safeguards to mitigate risks to a tolerable level, and ensuring that the process is documented, maintained, and audited. Students will demonstrate their knowledge through evaluating their current machine safety program system gaps, conducting a task-based risk assessment, and developing a Machinery Safety Management System outline to be used at their site or within a company.
Prerequisites: ASEM 610 [Min Grade: B]

ASEM 640. Introduction to Model-based Safety Assessments. 3 Hours.
This course provides students an introduction to model-based engineering and methods to assess holistic safety risks in their own company. These tools include requirements development, functional decomposition, design architecture, probabilistic risk assessment (PRA) measures, including, failure mode effects and criticality analysis (FMECA), fault tree analysis (FTA), and other safety engineering concepts. The role of a structured, formalized model-based engineering process, used to identify and mitigate hazards, is explored. Students engage in a rigorous model-based safety analysis project.
Prerequisites: ASEM 610 [Min Grade: B] or ASEM 611 [Min Grade: B] or ASEM 612 [Min Grade: B]

ASEM 690. Special Topics in (Area). 1-6 Hour.
Special Topics.

ASEM 691. Individual Study in (Area). 1-6 Hour.
Individual study.

CECM-Construction Egr Mgmnt Courses

CECM 669. Advanced Project Management. 3 Hours.
Skills generally required for sound project management in a variety of management settings are studied in addition to specific management issues typically associated with engineering and construction companies. Students are introduced to the Project Management Institute's Body of Knowledge (PMBOK). A discussion of corporate organizational structures and the evolving use of project management processes helps establish an appreciation for the role of a Project Manager. The elements of a project and the role and responsibilities of the Project Manager are studied in depth. Students are also acquainted with risk management concepts, financial, labor, safety, equipment, and contracting issues facing managers in the engineering and construction environment. Particular emphasis is placed on individual management strengths and weaknesses, team building, and characteristics of successful companies. One of the primary vehicles for discussion will be small case studies from real companies and the outside reading of one or two relevant topical books.

CECM 670. Construction Estimating and Bidding. 3 Hours.
Provides an overview of typical construction delivery systems and the planning and contracting associated with each. A broad study of estimating methodologies ranging from rough "ball park" estimates to detailed unit pricing is presented focusing on labor, equipment, materials, subcontractors, job conditions, location, overhead, and profit. This course is intended to establish a basic understanding of the estimating process; and therefore, substantial course focus will be placed on the term group project.

CECM 671. Construction Liability & Contracts. 3 Hours.
This course provides an overview of the fundamental aspects of the laws that affect construction and engineering companies as well as the project owners. Particular emphasis is placed on contract forms and provisions related to liability for engineering design and construction companies, the roles of the typical participation in the process, and dispute resolution. Students will learn the importance of contract language negotiations and the impact of project risk transfer.

CECM 672. Construction Methods and Equipment. 3 Hours.
This course provides students a big-picture understanding of the construction methods employed to bring the concepts and designs of architects and engineers to physical reality. The importance of building codes is presented in the course material. Detailed study of typical building materials, design details, and construction methods are presented in a logical sequence. Students will understand the planning and deployment of equipment, materials, labor, and subcontractors using a variety of building material and system types. This course provides a necessary baseline of knowledge, vocabulary, and understanding of the role and activities of the designers, engineers, material suppliers, inspectors, and constructors in the commercial building process.

CECM 673. Project Planning and Control. 3 Hours.
This course provides a thorough understanding of the project scheduling process in construction planning and control. Students learn the relationship between the work breakdown structure, organization breakdown structure, and the activities used in developing project schedules. The Critical Path Method (CPM), Precedence Diagram Method (PDM), Program Evaluation and Review Technique (PERT), and Line of Balance (LOB) scheduling methods are discussed in detail to include hand calculations and powerful computer software products. The use of scheduling techniques for project control, resources constraint management, cash flow management, risk management, and project completion date management are investigated as is the importance of communications in the planning and monitoring/controlling processes. Students will experience hands on use with Primavera scheduling software.

CECM 674. Green Building Design/Construction. 3 Hours.
The course addresses the key concepts, viewpoints and fundamentals essential for understanding green building and construction. Materials are focused on how key stakeholders and their future collaborations can begin to incorporate sustainable construction practices for the betterment of the project (new construction and inventory rehabilitation). The course will include instruction suitable to prepare students for the United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED©) Green Associates certification exam.

CECM 675. Advanced Construction and Engineering Economics. 3 Hours.
This course provides an extensive overview of financial and managerial accounting concepts for non-financial managers. Students will learn the basic elements of accounting (Generally Accepted Accounting Practices (GAAP)). They will understand how typical financial records and financial statements are established for companies. Once the basics are understood, students will study how financial data is used for internal cost controlling, planning, and budgeting. Fundamental financial calculations associated with the time value of money, debt instruments, taxes, inflation, and cash flow estimates are emphasized. Students will be expected to demonstrate proficiency in the use of Excel business functions in solving financial problems.

CECM 676. Construction Project Risk Management. 3 Hours.
This course addresses the methodologies employed in the engineering and construction industries to assist in rational decision-making in the face of uncertainty. The course reviews the fundamentals of common probabilistic theories and models, data sampling, hypothesis testing and the basics of Bayesian Decision Theory. In addition, basic financial analysis tools will be reviewed. Theoretical models will then be applied to specific examples encountered in engineering and construction decision making with emphasis on engineering economics applications.

CECM 688. Construction Management and Leadership Challenges in the Global Environment. 3 Hours.
This course is designed to prepare students to face the demanding management and leadership challenges facing construction and engineering industry leaders as competition becomes ever more globalized. The necessity to personally remain trained and relevant in the changing business environment is emphasized. Strategic planning, management and leadership in the built environment requires savvy leaders with exceptionally developed analytical and communications skills suitable for multi-disciplinary and multi-national ventures. Every individual and organization must continually innovate and reinvent to stay competitive. Students participate in a group project designed to reinforce the methodology associated with preparing and presenting a dynamic business plan. This course will provide the opportunity for students to discuss and research these concepts and to recognize the necessity to think independently, challenge conventional thinking, and visualize alternatives.

CECM 689. Building Information Modeling (BIM) Techniques. 3 Hours.
This course provides students with an overview of the evolution of BIM technology in the construction industry followed by hands-on training in the basic application of contemporary BIM software. Students will learn basic modeling skills and how to produce graphical presentations. Advanced applications of BIM technology will be discussed and demonstrated. Students will be provided with BIM software and will be required to complete a multi-step BIM model as a term project.

CESC-Sustainable Smart Cities Courses

CESC 600. Principles of Sustainable Development. 3 Hours.
The course will begin by discussing the concepts, viewpoints and fundamentals essential for understanding urban sustainable development agenda. This will be followed by the evaluation of international conferences and action items proposed by the scientific / professional community to advance sustainable smart cities development. You will review basic earth sciences to better evaluate the impact our anthropogenic activities have on the natural environment and therefore how to minimize adverse future outcomes. Throughout the course case studies of sustainable developments will be used to illustrate the value, challenges and limitations of this concept. In the end, you will possess the knowledge base needed to help advance sustainable smart cities development.

CESC 602. Introduction to Sustainable Smart Cities. 3 Hours.
This course introduces the issues surrounding sustainable development within cities and explores how the smart city concept can contribute to the urban sustainable development agenda. The course begins by considering the key characteristics of contemporary urbanization and the issues and challenges that these present for sustainability and urban environmental management. The meaning and nature of sustainability for cities will be discussed, followed by a consideration of the definitions of a smart city and a discussion of the key elements of a smart city including its contribution to both urban governance and the more effective and efficient management of natural resources. With reference to case studies the final part of the course will explore and evaluate the role that smart city processes and applications can play in enhancing the social, economic and environmental aspects of sustainable development within urban areas.

CESC 604. Low-Carbon and Renewable Energy Systems for Smart Cities. 3 Hours.
As the energy infrastructure is arguably the most important feature in any city energy efficiency and integration of renewable energy sources within urban areas are central to the smart city concept. This course will firstly explore why there is a need for the greater use of low carbon and renewable energy systems within cities, followed by an introduction to the range of low carbon and renewable energy technologies currently available. The course will then move on to introduce the concept of the smart grid and then explore the potential to integrate low carbon and renewable energy systems into smart grids in order to move towards cost-effective, efficient and more environmentally friendly energy provision within cities. Challenges and issues associated with the greater integration of low carbon and renewable energy systems into energy infrastructure within large urban areas will also be considered.

CESC 606. Managing Natural Resources and Sustainable Smart Cities. 3 Hours.
The course examines the challenges of resource use and management within the context of an urbanizing world, exploring how new concepts within the smart and sustainable city agenda may contribute to addressing these challenges. The course begins by considering contemporary patterns of resource use created by cities in the modern world at a variety of scales from the local to the global. New approaches in the form of ecosystem services and urban metabolism in relation to natural resource management are examined in terms of their contribution to developing a smart and sustainable city agenda. The course continues by exploring a selection of key natural resources challenges (e.g. water, energy, air quality and climate) and the development of new management approaches and strategies in these areas. The course concludes by examining the development of integrated environmental management systems and governance structures within which these new approaches can be implemented with reference to a series of case studies.

CESC 608. Green Infrastructure and Transportation. 3 Hours.
The course covers policy and technical issues related to sustainable transportation. The course begins by discussing the concepts, viewpoints and fundamentals essential for understanding sustainable transportation planning. Tools used to assess sustainability of transportation facilities and neighborhoods are introduced next. The course also presents design options in support of green infrastructure and transportation, including livable street design, and traffic calming applications. The course is expected to expand students' knowledge base on sustainable transportation issues and help them understand the concept of sustainable transportation toward the development of sustainable smart cities.

CESC 610. Health and Liveability. 3 Hours.
This course will address the multidisciplinary aspects of urban environmental quality and its impact on human well-being. It will provide a critical appreciation of the factors which influence health, well-being and quality of life within contemporary urban environments, demonstrate the importance of genomics and health informatics in developing strategies for improving the health and well-being of urban citizens, explore the importance of urban design and the contribution of the development of food smart cities in improving both urban health and liveability, and understand the increasingly important role of Information and Communications Technology (ICT) in facilitating delivery of effective and responsive urban health, well-being, and quality of life strategies.

CESC 612. Green Buildings. 3 Hours.
The course will begin by discussing the concepts, viewpoints and fundamentals essential for understanding green building and construction. Discussions will then be focused on how key stakeholders and their future collaborations can begin to incorporate sustainable construction practices for the betterment of the project (new construction and inventory rehabilitation). This will be followed by the evaluation of sustainable construction rating systems (LEED, BREEAM, etc.) and how they can be applied to occupied buildings throughout an urban environment. Modular case studies of sustainable construction projects (individual structures to entire community developments) will be used to illustrate the value, challenges and limitations of this concept. In the end, students will possess an expanded knowledge base needed to help advance sustainable smart cities development.

CESC 614. Smart Cities Technologies. 3 Hours.
This course gives students the opportunity to study emerging smart technologies that can be deployed and integrated together with the aim of improving overall building / city performance. The course provides an overview of technologies that can be used to: sense and measure physical parameters; acquire, process, and analyze various datasets; and make appropriate decisions / gives suitable instructions based on all available information. Specific technologies addressed include Data Acquisition, Telecommunications, Wireless Sensor Networks, and the Internet of Things. The course will also explore and evaluate how these emerging technologies can contribute to various smart cities / buildings priorities, namely Energy Management, Health, Safety, and Security.

CESC 616. Big Data and Smart Cities. 3 Hours.
The world is becoming increasingly digitally interconnected and this instrumentation, data collection, interconnection, storage, and analysis can provide the capacity to radically transform how cities monitor, manage and enhance their environmental quality and livability. This course will provide an introduction to what big data is and how it can contribute to the smarter, more sustainable management of cities. The course will begin by discussing the concepts of big data and the big data revolution, and an overview of the ways in which data can be captured, stored and analyzed. This will be followed by a consideration of how big data can be used by city managers to optimize: their use of physical and digital infrastructures; their sustainable use of natural resources; citizen service delivery; and citizen engagement, participation and urban governance. You will also be introduced to some of the challenges presented by big data, both the technological challenges and the ethical and social implications associated with collecting, storing and using big data. Throughout the course case studies of big data in action will be used to illustrate the value, challenges and limitations of big data in the smarter, more sustainable management of cities.

CESC 618. Research Methods and Project Planning. 3 Hours.
As a student of smart city processes and urban environmental management you need to understand the research process which enables you to take the knowledge and skills which you have learned and apply it to a specific urban sustainability / environmental management issue. This course is not intended to provide a training in research techniques, but rather to make you aware of a wide range of investigative and analytical methods and techniques using examples drawn from the areas of smart city approaches, urban sustainability and environmental management. Both quantitative and qualitative methodologies and primary and secondary data collection will be covered. You will be encouraged to reflect on the research process and its outcomes by critiquing research papers written from methodological standpoints. You will then apply this knowledge to create a viable research proposal for your own Sustainable Smart Cities Masters project. This proposal will require you to identify and justify for your chosen topic: (i) appropriate research questions, (ii) methodologies and data sampling / collection techniques, (iii) ethical and health and safety implications and, (iv) a timetable of action.

CESC 620. Sustainable Smart Cities Research Project. 0 Hours.
This course will develop skills in both research and technical writing in the area of applying and/or evaluating sustainable smart cities processes and policies to a specific urban environmental or sustainability issue. The research proposal produced as part of the Research Methods and Project Planning course will be implemented. This will involve further research into the relevant background and context of a chosen project topic, implementation and evaluation of appropriate methods for collecting and analyzing data, observations and information, the ability to present findings clearly and concisely, and appreciate their significance in relation to the smart city and sustainable urban management agendas. Research should be at the forefront of student's chosen sustainable smart cities research topic and be at a level similar to that required for acceptance and presentation at a national level conference or symposium on smart and sustainable cities. For students in relevant employment, projects may be carried out in your place of work subject to discussions between you, your employer/line manager, and your project supervisor.

CESE - Structural Engineering Courses

CESE 653. Wood and Masonry Design. 3 Hours.
Design of wood structures to meet the requirements of the National Design Specification including beams, columns, and shear walls. Design and detailing of masonry structures. Nomenclature, properties, and specifications for components. Design of assemblages and masonry elements in simple masonry structures.

CESE 656. Advanced Mechanics of Materials for Structural Engineering. 3 Hours.
This course will review the basic fundamentals of mechanics of materials and will extend the concepts to include 3-dimensional stress and strain, plastic behavior, energy methods, nonlinear behavior, fatigue and fracture, rectangular linear elastic plates, indeterminate structures and stability.

CESE 657. Advanced Design of Steel Structures. 3 Hours.
Design of major components in steel-framed buildings, including composite beams and slabs, beam-columns, moments connections, bracing members, bracing connections, and column base plates.

CESE 659. Advanced Reinforced Concrete. 3 Hours.
In this course students will study the behavior and design of continuous reinforced concrete structures submitted to gravity and lateral loads. The study will include biaxial loading of columns, continuous one-way beams and slabs, two-way floor systems, and torsion loading.

CESE 660. Prestressed Concrete Behavior and Design. 3 Hours.
The course will explore the characteristics and design of pre-stressed concrete structural components to include elastic and ultimate strength analyses for flexural, shear, torsion, deflection, strand bond, and pre-stress loss.

CESE 662. Advanced Structural Analysis. 3 Hours.
This course explores the structural analysis of indeterminate structures using classical and approximate methods and structural analysis software. Specific emphasis is placed on the determination of forces in typical multistory, rectilinear frames subject to gravity and lateral loads. In addition to first order analysis, the course included analysis for second order effects and plastic analysis.

CESE 664. Bridge Engineering. 3 Hours.
This course includes the study of bridge loads, including moving load analysis; methods for approximate structural analysis, preliminary bridge design methods, and the structural design of bridge decks and girders.

CESE 665. Structural Dynamics and Earthquake Engineering. 3 Hours.
This course includes the study of earthquake-induced vibrations of single and multi-degree-of-freedom systems, such as single and multistory frames. Emphasis will be placed on structural steel and reinforced concrete building frames. Response spectrum analysis will be investigated as well as building codes and static and dynamic lateral load force procedures.

CESE 676. Design of Structural Steel Connections. 3 Hours.
Design of bolted and welded steel connections, including shear, moment and brace connections using the AISC Specifications requirements and fundamental engineering principals. Design procedures will be discussed for various structural steel connections. The background and limitations of the design procedures will be reviewed and practical solutions will be provided.

CESE 690. Special Topics (Area). 1-3 Hour.
Special Topics (Area).

CESE 698. Non Thesis Research. 3 Hours.
No syllabus for non-thesis research hours.

IEM-Information Egr Mgmnt Courses

IEM 601. Introduction to IEM. 1 Hour.
This course is an introduction to Information Engineering and Management with a focus on readiness for graduate study. Program requirements and expectations will be presented. Software and collaboration tools will be introduced. Library access and resources will be reviewed and teams will perform learning exercises to demonstrate proficiency with the available tools.

IEM 602. Leading Collaborative Teams. 1 Hour.
This course will focus on building, leading, and evaluating collaborative teams. Topics will include managing geographically-dispersed teams, team communication, accountability, running effective meetings, facilitation skills, building consensus, and handling common problems.
Prerequisites: IEM 601 [Min Grade: C]

IEM 603. Communication for Technology Executives. 1 Hour.
This course will address communication issues unique to organizational executives. Topics will include functioning as the public face of the organization, working with the media, when to seek professional advice, and effective crisis management.
Prerequisites: IEM 602 [Min Grade: C]

IEM 610. Communication for Technology Professionals. 3 Hours.
This course focuses on recognizing, developing, and putting into practice effective communication skills. Lectures provide insights into presentation structure, style, and content. Self-evaluation exercises combined with personal coaching will help clients improve their professional speaking and presentation skills.

IEM 611. Leading Technical Organizations. 3 Hours.
This course will use case studies, assigned readings, guest lecturers, research projects, and discussion of current issues in technology to develop executive-level behaviors and thought-processes as preparation for starting or leading a technology organization.

IEM 612. Project Leadership. 3 Hours.
This course teaches the fundamental concepts of leading projects. The course will consider all aspects of project leadership including the use of standard methodologies. Best practices will be reviewed along with practical insights based on real-world project leadership experience.

IEM 620. Technical Entrepreneurship. 3 Hours.
This course is an introduction to entrepreneurship that begins with the development of personal insights and work habits that are fundamental to success within any organization.

IEM 625. Technology and Innovation. 3 Hours.
This course examines technological innovation as an element of organizational strategy. Topics include the nature and management of innovation, aligning technical teams with overall organizational strategy, and the role of innovation in launching and sustaining technology ventures.

IEM 630. Systems Engineering. 3 Hours.
This course focuses on the systems engineering lifecycle and its application to the design of complex systems. Topics include systems thinking, managing complexity, problem definition, solution design, solution implementation, quality assurance, and measuring effectiveness.

IEM 631. Operational Decision-Making. 3 Hours.
This course focuses on the critical role of information and analytical methods in optimizing operational decisions. A core set of analytical tools will be presented and discussed. Topics will include decision analysis, optimization, modeling, simulation, and data analysis.

IEM 645. Financial Concepts for Entrepreneurs. 3 Hours.
This course introduces financial concepts including the interpretation of financial statements, managing cash flow, time value of money, capital budgeting, and investment analysis.

IEM 646. Strategic Planning. 3 Hours.
This course will examine the nature of strategic thinking and the challenges of achieving strategic alignment. Topics will include the strategic planning process and methods for assessing strategic success.

IEM 690. Special Topics in Area. 1-3 Hour.
Special Topics in (Area).

IEM 695. IEM Design Project. 3 Hours.
This course is focused upon a final design project that incorporates the technical and entrepreneurial coursework taken previously. Projects will be assessed based on their technical design and financial justification.

IEM 696. IEM Internship. 1-3 Hour.
This course is available for students needing to register for an internship course while enrolled in the IEM program.