

2012-2013 LONG SIGNATURE SHEET



UNC CHARLOTTE

Proposal Number: EMGT 2-5-13

Proposal Title: Establishment of MSEM Concentrations and Curriculum Revision

Originating Department: Systems Engineering & Engineering Management

TYPE OF PROPOSAL: UNDERGRADUATE _____ GRADUATE X UNDERGRADUATE & GRADUATE _____
 (Separate proposals sent to UCCC and Grad. Council)

DATE RECEIVED	DATE CONSIDERED	DATE FORWARDED	ACTION	SIGNATURES
1/5/13	1/16/13	1/16/13	Approved	<u>DEPARTMENT CHAIR</u> Dr. Ertunga C. Ozelkan
25-Mar 2013		28-Mar 2013	Approved	<u>COLLEGE CURRICULUM COMMITTEE CHAIR</u> Dr. Asis Nasipuri Dr. Wesley Williams
			Approved	<u>COLLEGE FACULTY CHAIR (if applicable)</u> Dr. Jeff Kimble
			Approved	<u>COLLEGE DEAN</u> Dr. Robert Johnson
			Approved	<u>GENERAL EDUCATION</u> (if applicable; for General Education courses) [print name here:]
			Approved	<u>UNDERGRADUATE COURSE & CURRICULUM COMMITTEE CHAIR</u> (for undergraduate courses only)
4-27-13	5-7-13	5-9-13	Approved	<u>GRADUATE COUNCIL CHAIR</u> (for graduate courses only) Dr. Rob Roy McGregor
				<u>FACULTY GOVERNANCE ASSISTANT</u> (Faculty Council approval on Consent Calendar)
				<u>FACULTY EXECUTIVE COMMITTEE</u> (if decision is appealed)



UNC CHARLOTTE

LONG FORM COURSE AND CURRICULUM PROPOSAL

*To: Dr. Wesley Williams (Curriculum Committee Chair) / Dr. Asis Nasipuri
(Engineering Graduate Committee Chair)

From: Dr. Ertunga Ozelkan

Date: 1/16/13

Re: Establishment of MSEM Concentrations and Curriculum Revision

The Long Form is used for major curriculum changes. Examples of major changes can include: creation of a new major, creation of a new minor, creation of a new area of concentration, or significant changes (more than 50%) to an existing program (Note: changing the name of an academic department does not automatically change the name(s) of the degree(s). The requests must be approved separately by the Board of Governors.)

Submission of this Long Form indicates review and assessment of the proposed curriculum changes at the department and collegiate level either separately or as part of ongoing assessment efforts.

*Proposals for undergraduate courses should be sent to the Undergraduate Course and Curriculum Committee Chair. Proposals related to both undergraduate and graduate courses, (e.g., courses co-listed at both levels) must be sent to both the Undergraduate Course and Curriculum Committee and the Graduate Council.

University of North Carolina at Charlotte

Revised Graduate Course and Curriculum Proposal from: Systems Engineering & Engineering Management

PROPOSAL NUMBER: EMGT 2-5-13

TITLE. Establishment of MSEM Concentrations and Curriculum Revision

CONTENT OF THE PROPOSAL

A. PROPOSAL SUMMARY.

1. SUMMARY.

The Systems Engineering and Engineering Management (SEEM) Program proposes to make the following revisions to the Master of Science in Engineering Management (MSEM) Curriculum and to the Graduate Catalog:

- i. Add three concentrations in**
 - a. Energy Systems
 - b. Lean Six Sigma
 - c. Logistics and Supply Chain

- ii. Revise the title of several similarly named courses**
 - a. EMGT6915 Engineering Decision and Risk Analysis (changes underlined and marked in blue)
 - b. EMGT6910 Technological Forecasting & Decision-Making (changes underlined and marked in blue)

- iii. Introduce new courses:**
 - a. EMGT 5961 Introduction to Energy Systems (3)
 - b. EMGT 5962 Energy Markets (3)
 - c. EMGT 5963 Energy Systems Planning (3)
 - d. EMGT 5964 Case Studies in the Energy Industry (3)
 - e. EMGT6924 Lean Six Sigma Practice and Management (3) (course code and title changed)
 - f. EMGT6926 Lean Supply Networks (3) (course code changed)
 - g. EMGT 5090 Special Topics
 - h. EMGT 5150 Leadership For Engineers

- iv. Update the MSEM catalog descriptions on:**
 - a. Admission criteria description
 - b. Faculty list
 - c. Early Entry Program requirements
 - d. List of required core courses
 - e. List of elective courses

JUSTIFICATION.

2. Identify the need addressed by the proposal and explain how the proposed action meets the need.
- i. **The three concentrations in Energy Systems, Lean Six Sigma and Logistics and Supply Chain** will help meet market demand and increase the appeal of the degree.

Energy Systems Concentration:

William States Lee College of Engineering and UNC Charlotte have made significant investments in the area of energy systems engineering by building the Energy Production and Infrastructure Center (EPIC). This concentration is well aligned with the college and university strategy of making UNC Charlotte a leading institution in energy related research and education. As indicated in the attached support letter from EPIC (see Appendix) the proposed energy systems concentration will help systems engineering and engineering management students build necessary skills to be successful in the energy industry.

Lean Six Sigma Concentration:

Lean System design is an important emphasis of the Systems Engineering and Engineering Management Program, which also hosts the Center for Lean Logistics and Engineered Systems (CLLES). The program and center faculty have been conducting research and training in this area for many years (please see recent press release on the UNC Charlotte web-site: <http://publicrelations.uncc.edu/news-events/news-releases/unc-charlotte-partners-local-law-firm-lean-six-sigma-training>). The faculty play active role in national societies such as the Institute of Industrial Engineers (IIE) Lean Division. Over the past 7 years, Lean Supply Networks and Lean Practice and Management course were taught under special topics (EMGT 6090). Lean Supply Networks course has received IIE Lean Division Excellence in Teaching Award in 2006 from the Institute of Industrial Engineers (IIE). The proposed concentration and related courses will help the SEEM program align with the industry and students' interest. SEEM program also proposes to expand the content of the Lean Practice and Management course including the related Six Sigma process design methodologies. The main justification for this renaming is that over time Lean Systems and Six Sigma methodologies have merged and many companies today refer to "Lean Six Sigma" instead.

Logistics and Supply Chains Concentration:

This concentration will help students to focus on global logistics supply networks engineering and management. Logistics and Supply Chains concentration is well aligned with the mission of Center for Lean Logistics and Engineered Systems (CLLES) hosted by the SEEM Program and also with the local industry trends. Charlotte is a logistics, transportation and distribution hub for many fortune 500 firms and ranked high nationally with respect to the number of trucking companies and wholesaling centers (Charlotte Chamber of Commerce, www.charlottechamber.org). Logistics and Supply Chains is an area where we believe we can leverage some synergies with related programs at the university. Thus, it is our aim to leverage

existing courses from the MBAD program to support this concentration.

- ii. **Revise the numbering and title of several similarly named courses** to decrease confusion and to better reflect course content.
- iii. **Introduction of new courses** will support the proposed concentrations as described below:

Energy Systems Concentration:

SEEM proposes to add four new 3-credit hour Energy Systems concentration courses.

- EMGT 5961 Introduction to Energy Systems (3)
- EMGT 5962 Energy Markets (3)
- EMGT 5963 Energy Systems Planning (3)
- EMGT 5964 Case Studies in the Energy Industry (3)

Note: These courses are cross-listed with the SEGR 4XXX level courses with the same names. A separate proposal for the undergraduate courses and an undergraduate energy systems concentration is being proposed simultaneously.

Lean Six Sigma Concentration:

The students need to take the following three (modified and existing required) courses

- EMGT6924 Lean **Six Sigma** Practice and Management (3) (course code and title changed)
- EMGT6926 Lean Supply Networks (3) (course code changed)
- EMGT 6905 Designed Experimentation (3)

Plus one of the following (existing) courses

- EMGT 6901 Advanced Project Management (3)
- EMGT 6904 Product and Process Design (3)
- EMGT 6142 Quality & Manufacturing Mgmt (3)

Logistics and Supply Chains Concentration:

The students need to take the following two (existing and modified) required courses

- EMGT6920 Logistics Engineering and Management (3)
- EMGT6926 Lean Supply Networks (3) (course code changed)

Plus two of the following

- EMGT 5963 Energy Systems Planning (3)
- EMGT 6142 Quality & Manufacturing Mgmt (3)
- MBAD 6193 Global Business Environment (3)
- MBAD 6208 Supply Chain Management (3)

Besides the four energy courses (EMGT 5961, EMGT 5962, EMGT 5963, EMGT 5964) and the modified courses (EMGT 6924 and EMGT 6926) described above, two more courses are proposed as detailed below:

The following is a special topics course to be used for cross-listing upper level undergraduate courses. With the offering of the BS in Systems Engineering since 2008 the need for cross-listing upper level undergraduate courses with graduate courses has emerged. This 5000 level course will address that need:

- EMGT 5090 Special Topics

The following is a new course on leadership that will be cross-listed with a corresponding undergraduate section

- EMGT 5150 Leadership For Engineers

iv. Update the MSEM catalog descriptions:

- Update the admission criteria description** to simplify and to make it concise and less confusing:
- Update the “documents to be submitted for admission” section of the catalog** to simplify and to make it concise and less confusing:
- Update the list of graduate faculty list** to include new faculty and to reflect recent title changes in the program
- Update the “Early Entry Program” requirements** a) to reflect the 3.2 GPA requirement as mentioned in the undergraduate catalog and b) to include systems engineering in the list of eligible degrees
- Update the “Required Core Courses”** to reflect proposed changes related to the new courses and to move some of the existing courses from core to electives.
- Update the list of “Elective Courses” to include new courses**, to reflect course title changes and to include MBA courses.

SEEM Program proposes to make the MBAD Courses electives to synchronize the on-campus and online MS in Engineering Management programs. Since the MBAD courses are not offered online, SEEM program is not able to mandate these courses as required core courses for the distance education students. Having the MBAD courses as optional will resolve this conflict.

- 3. Discuss prerequisites/corequisites for course(s) including class-standing, admission to the major, GPA, or other factors that would affect a student’s ability to register.**

The following two energy courses, EMGT 5962 and EMGT 5964 require taking EMGT 5961 as a prerequisite/corequisite. EMGT 5963 require either EMGT 5961 or ECON 5181 as a prerequisite/corequisite. Please see Appendix for a syllabus for each of the proposed courses.

4. Demonstrate that course numbering is consistent with the level of academic advancement of students for whom it is intended.

UNC Charlotte course numbering guidelines were followed for each courses proposed. 5000 level courses are going to be cross-listed with 4000 level counter parts.

5. In general, how will this proposal improve the scope, quality and/or efficiency of programs and/or instruction?

The proposed changes will enhance the quality of the MSEM program from admissions and curriculum perspectives. Thus, it will help making it more attractive to prospective students.

6. If course(s) has been offered previously under special topics numbers, give details of experience including number of times taught and enrollment figures.

Over the past 7 years, Lean Supply Networks and Lean Practice and Management course were taught under special topics (EMGT 6090). EMGT 6090 Lean Supply Networks was offered in Fall 2005 and Spring 2007, and EMGT 6090 Lean Practice and Management was offered in Spring 2008, Fall 2009, and Summer 2012. The average enrollment has been approximately 13-15 students.

- B. IMPACT.** Changes to courses and curricula often have impacts both within the proposing department as well as campus-wide. What effect will this proposal have on existing courses and curricula, students, and other departments/units? Submit an Impact Statement that fully addresses how you have assessed potential impacts and what the impacts of this proposal might be. Consider the following:

1. What group(s) of students will be served by this proposal? (Undergraduate and/or graduate; majors and/or non-majors, others? Explain). Describe how you determine which students will be served.

The main audience for the proposed courses is MSEM students. The 5000 level energy courses will also be cross-listed with 4000 level counterparts under the BSSE (BS in Systems Engineering) degree program. The 4000 level courses require student to be in junior standing to enroll these upper level undergraduate courses. All courses are available other UNC Charlotte students as electives.

2. What effect will this proposal have on existing courses and curricula?
 - a. When and how often will added course(s) be taught?

The proposed courses will be offered on-demand. It is the intention of the SEEM program to schedule the energy related courses at least once a year.

b. How will the content and/or frequency of offering of other courses be affected?

The scheduling of other courses will not be affected.

c. What is the anticipated enrollment in course(s) added (for credit and auditors)?

Energy related courses will attract 30-50 students since they are cross-listed with the undergraduate 4000 level courses. Other graduate courses are expected to attract 15-20 students.

d. How will enrollment in other courses be affected? How did you determine this?

Currently the program offers 4-5 courses every semester. By keeping the number of courses per semester the same, we believe that the enrollment in other courses will not have a big impact. We are also planning to schedule some of the new courses in summer which will again help keeping Fall/Spring course enrollment numbers steady while helping students to finish their degree sooner which is aligned with UNC

e. Identify other areas of catalog copy that would be affected, including within other departments and colleges (e.g., curriculum outlines, requirements for the degree, prerequisites, articulation agreements, etc.)

As indicated earlier, we are proposing to make several MBAD courses electives to synchronize the oncampus and online MSEM curriculum. We do not believe that this will cause a significant impact since we will still allow those oncampus students who are interested in taking MBAD courses under the electives category.

III. RESOURCES REQUIRED TO SUPPORT PROPOSAL.

When added resources are not required, indicate “none”. For items which require “none” explain how this determination was made.

A. PERSONNEL. Specify requirements for new faculty, part-time teaching, student assistants and/or increased load on present faculty. List by name qualified faculty members interested in teaching the course(s).

The proposed energy courses require two full-time faculty and help from 1-2 part-time faculty.

EPIC has hired Dr. Badrul Chowdhury (who is a jointly appointed in Electrical and Computer Engineering and Systems Engineering) to lead the proposed energy concentration under Systems Engineering and Engineering Management. EPIC has also committed to hire an additional full-time Energy Systems Engineering faculty to support the proposed Energy concentration. While initially, Dr. Chowdhury and several adjunct faculty will be delivering the proposed energy courses, in the long term some of the teaching responsibility is planned to be transferred to the full-time faculty to be hired. EPIC and SEEM Program have already identified several potential adjunct faculty, who are industry subject matter experts. These experts have been providing significant input for the development of the energy concentration related courses.

EPIC, SEEM program and Economics department are currently investigating collaborative teaching opportunity for the proposed EMGT 5963 Energy Markets Course. This collaboration would leverage the expertise of Drs. Peter Schwarz (Economics Professor) and Dr. Chowdhury (SEEM/ECE Professor).

See Appendix for a support letter from EPIC Director Dr. Johan Enslin

B. PHYSICAL FACILITY. Is adequate space available for this course?

Yes.

C. EQUIPMENT AND SUPPLIES: Has funding been allocated for any special equipment or supplies needed?

N/A

D. COMPUTER. Specify any computer usage (beyond Moodle) required by students and/or faculty, and include an assessment of the adequacy of software/computing resources by available for the course(s).

The proposed courses do not have any special computer requirements. Existing Mosaic Computing labs will be utilized when needed to support teaching.

E. AUDIO-VISUAL. If there are requirements for audio-visual facilities beyond the standard classroom podiums, please list those here.

All engineering management courses are offered both in oncampus and online formats. Williams States Lee College of Engineering has already invested in online learning infrastructure. EPIC building has several online delivery capable classrooms. Most recently Cameron 101 and 154 has been equipped with lecture capture capability as well.

F. OTHER RESOURCES. Specify and estimate cost of other new/added resources required, e.g., travel, communication, printing and binding.

N/A

G. SOURCE OF FUNDING. Indicate source(s) of funding for new/additional resources required to support this proposal.

EPIC has committed to provide all the funds to run the system engineering and engineering management energy concentrations.

See Appendix for a support letter from EPIC Director Dr. Johan Enslin

IV. CONSULTATION WITH THE LIBRARY AND OTHER DEPARTMENTS OR UNITS

- A. LIBRARY CONSULTATION.** Indicate written consultation with the Library Reference Staff at the departmental level to ensure that library holdings are adequate to support the proposal prior to its leaving the department. (Attach copy of [Consultation on Library Holdings](#)).

See Appendix.

- B. CONSULTATION WITH OTHER DEPARTMENTS OR UNITS.** List departments/units consulted in writing regarding all elements outlined in IIC: Impact Statement, including dates consulted. Summarize results of consultation and attach correspondence. Provide information on voting and dissenting opinions (if applicable).

Energy Production and Infrastructure Center – EPIC (see Appendix for supporting letter)

Business School: EPIC and SEEM program faculty had a meeting with Dr. Christie Amato (Associate Dean for Graduate Programs & Professor at the Belk College of Business) on December 12, 2012. On January 16, 2013 Dr. Amato was provided a draft of the proposal to be shared with the Business School faculty. (Please see Appendix for a copy of the related communication). An additional meeting with Dr. Christie Amato, the Department of Economics Chair (Dr. Jennifer Troyer), Economics Professor (Dr. Peter Schwarz), EPIC Director (Dr. Johan Enslin), and EPIC/SEEM faculty (Dr. Badrul Chowdhury, Dr. Ronak Bhat) and SEEM Program Director (Dr. Ertunga Ozelkan) took place on February 7, 2013.

V. INITIATION, ATTACHMENTS AND CONSIDERATION OF THE PROPOSAL

- A. ORIGINATING UNIT.** Briefly summarize action on the proposal in the originating unit including information on voting and dissenting opinions.

A draft proposal about the proposed energy concentration has been initiated on June 21, 2012 by Dr. Ertunga Ozelkan after consultation with EPIC and SEEM faculty. The SEEM Energy concentration proposal was finalized by a sub-committee including several SEEM and EPIC Faculty (Dr. Ertunga Ozelkan, Dr. Badrul Chowdhury, Dr. Johan Enslin, Dr. David Young) and several industry experts in December 2012. The draft Energy concentration proposal was shared with the Business School on December 12, 2012.

MSEM Curriculum Revision proposal including the proposed concentrations were approved unanimously by the SEEM faculty in January, 2013.

B. CREDIT HOUR. (Mandatory if new and/or revised course in proposal)
Review statement and check box once completed:

The appropriate faculty committee has reviewed the course outline/syllabus and has determined that the assignments are sufficient to meet the University definition of a [credit hour](#).

C. ATTACHMENTS.

1. CONSULTATION: Attach relevant documentation of consultations with other units.

See Appendix

2. COURSE OUTLINE/SYLLABUS: For undergraduate courses attach course outline(s) including basic topics to be covered and suggested textbooks and reference materials with dates of publication. For Graduate Courses attach a course syllabus. Please see Boiler Plate for Syllabi for New/Revised Graduate Courses.

See Appendix

3. PROPOSED CATALOG COPY: Copy should be provided for all courses in the proposal. Include current subject prefixes and course numbers, full titles, credit hours, prerequisites and/or corequisites, concise descriptions, and an indication of when the courses are to be offered as to semesters and day/evening/weekend. Copy and paste the [current catalog copy](#) and use the Microsoft Word "track changes" feature (or use **red text with "strikethrough"** formatting for text to be deleted, and adding **blue text with "underline"** formatting for text to be added).

a. For a new course or revisions to an existing course, check all the statements that apply:

This course will be cross listed with another course.

There are prerequisites for this course.

There are corequisites for this course.

This course is repeatable for credit.

This course will increase/decrease the number of credits hours currently offered by its program.

This proposal results in the deletion of an existing course(s) from the degree program and/or catalog.

For all items checked above, applicable statements and content must be reflected in the proposed catalog copy.

Current 2012-2013 Graduate Catalog:

Systems Engineering and Engineering Management ~~Program~~

Cameron 206

704-687-~~3535~~ 1953

<http://seem.uncc.edu>

Graduate Program Director

~~Dr. S. Gary Teng~~

Dr. Ertunga C. Ozelkan

Graduate Faculty

Badrul Chowdhury, Professor

~~Steven Gardner, Adjunct Professor~~

Churlzu Lim, Associate Professor

Agnes Galambosi Ozelkan, Adjunct Professor

Ertunga Ozelkan, Associate Professor **and Director**

Yesim Sireli, Associate Professor

S. Gary Teng, Professor ~~and Director~~

The Master of Science Degree in Engineering Management program prepares professionals for careers in managing projects, programs, systems, and organizations. Industrial, research, consulting, and commercial firms now demand engineering managers with both cutting-edge technical competence and the management skills necessary to forge linkages with the systems and business sides of these organizations. These managers must be able to form and manage high performance teams and manage business and technological operations. The program of study is necessarily multidisciplinary, combining elements of advanced study in various engineering disciplines with studies of business and system operations and organizational behavior.

Additional Admission Requirements

In addition to the general requirements for admission to the Graduate School, the Engineering Management program seeks the following from applicants to the ~~Master's~~ Master of Science program in Engineering Management:

1. Either a bachelor's degree in engineering or a closely related technical or scientific field, or a bachelor's degree in business, provided relevant technical course requirements have been met.
2. Undergraduate coursework in engineering economics, calculus, and statistics.
3. An average grade of 3.0 (out of 4).
- ~~1. — Either a bachelor's degree in engineering or a closely related technical or scientific field, or a bachelors degree in business, provided relevant technical course requirements have been met. It is expected that some students in the second category will have a major in business and a minor in engineering.~~

- ~~2. Undergraduate coursework in engineering economics (SEGR 2106 at UNC Charlotte).~~
- ~~3. Integral and differential calculus (MATH 1120 and 1121 at UNC Charlotte).~~
- ~~4. Statistics (STAT 1220 or STAT 3128 at UNC Charlotte).~~
- ~~5. An average grade of 3.0 (out of 4) on items 2, 3, and 4 above.~~

Documents to be Submitted for Admission

1. Transcript(s) showing a baccalaureate degree in engineering, engineering technology, or a scientific discipline, or a baccalaureate degree in business administration from an accredited college or university.
2. A satisfactory score on the General Test of the Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT). ~~(depending on the student's background, the Graduate Management Admission Test, GMAT, may be substituted in certain cases).~~
3. Written descriptions of any relevant and significant work experience.
4. If the applicant's native language is not English, an overall score of 575 (paper-based test), 230 (computer-based test), or 90 (Internet-based test) in the Test of English as a Foreign Language (TOEFL).

Early Entry Program

Undergraduate students **with a GPA of 3.2 and higher** and with at least 75 semester hours completed toward a baccalaureate degree in **Systems**, Civil, Electrical, or Mechanical engineering, or Engineering Technology at UNC Charlotte may be admitted to the MS Engineering Management Program as an Early Entry student provided they meet all other requirements of admission except the first item of the admission requirements.

Degree Requirements

Thirty semester hours of approved graduate work within one of two options:

Option 1

Successful completion of 30 semester hours of graduate-level coursework.

Option 2

Successful completion of 24 semester hours of graduate-level coursework and 6 hours of thesis research.

The curriculum consists of six core courses and four additional courses (or two courses with the thesis option) selected from an approved list of electives. Students are expected to complete a Plan of Study that identifies a concentration such as **Energy Systems**,

~~Manufacturing Management, Technology Management,~~ Systems Engineering Management, Lean Six Sigma or Logistics and Supply Chains Management.

Required Core Courses (12 Credits)

1. EMGT 6980 Industrial and Technology Management Seminars (1)

(EMGT students must have three credits in this course.)

2. ~~Three~~ One to two courses from the following:

- EMGT 6142 Quality & Manufacturing Mgmt (3)
- EMGT 6901 Advanced Project Management (3)
- ~~• EMGT 6902 Legal Issues in Engineering Mgmt (3)~~
- EMGT 6904 Product and Process Design (3)
- ~~• EMGT 6906 Processing Systems Simulation (3)~~
- EMGT 6930 Capital Cost Estimating (3)
- EMGT6920 Logistics Engineering and Management (3)
- EMGT6924 Lean Six Sigma Practice and Management (3)
- EMGT 6950 Engineering Systems Integration (3)
- ~~• EMGT 6955 Systems Reliability Engineering (3)~~
- ~~• EMGT 6985 Engineering Management Project (3)~~

3. One to two courses from the following:

- EMGT 6905 Designed Experimentation (3)
- EMGT 6906 Processing Systems Simulation (3)
- EMGT 6910 Technological Forecasting and Decision-Making (3)
- EMGT 6912 Techniques and Intelligent Tools for Engineering Decision Support (3)
- EMGT 6915 Engineering Decision and Risk Analysis (3)
- EMGT 6952 Engineering Systems Optimization (3)
- EMGT 6955 Systems Reliability Engineering (3)

~~3. Two courses from among the following:~~

- ~~MBAD 6141 Operations Management (3)~~
- ~~MBAD 6161 Org Leadership & Behavior I (3)~~
- ~~MBAD 6164 Executive Communications (3)~~
- ~~MBAD 6195 Strategic Mgmt of Technology (3)~~

Note: Students are required to have adequate preparation prior to taking the required MBAD (Master in Business Administration) courses. Traditionally, this consists of at least completing courses in engineering economics, foundations of economics, and mathematics through differential and integral calculus. Students are advantaged by having completed courses in foundations of accounting and statistics.

Concentrations (12 credits)

The students can sign-up for the following optional concentrations

Energy Systems Concentration

The students need to take the following four courses

- EMGT 5961 Introduction to Energy Systems (3)
- EMGT 5962 Energy Markets (3)
- EMGT 5963 Energy Systems Planning (3)
- EMGT 5964 Case Studies in the Energy Industry (3)

Lean Six Sigma Concentration:

The students need to take the following three required courses

- EMGT6924 Lean Six Sigma Practice and Management (3)
- EMGT6926 Lean Supply Networks (3)
- EMGT 6905 Designed Experimentation (3)

Plus one of the following

- EMGT 6901 Advanced Project Management (3)
- EMGT 6904 Product and Process Design (3)
- EMGT 6142 Quality & Manufacturing Mgmt (3)

Logistics and Supply Chains Concentration:

The students need to take the following two required courses

- EMGT6920 Logistics Engineering and Management (3)
- EMGT6926 Lean Supply Networks (3)

Plus two of the following

- EMGT 5963 Energy Systems Planning (3)
- EMGT 6142 Quality & Manufacturing Mgmt (3)
- MBAD 6193 Global Business Environment (3)
- MBAD 6208 Supply Chain Management (3)

Based on department approval, students may request to take other Graduate Courses related to their selected concentration. Students are responsible for fulfilling the prerequisites of the courses they plan to take from other graduate programs.

Interdisciplinary Elective Courses

Depending on the degree and concentration options selected, the students would need to fulfill the remaining credit hours by taking elective courses.

~~(four courses or two courses with thesis option)~~ Any course from the ~~following~~ Engineering Management Program ~~course list~~ including the ones below can be taken as an elective course ~~or approved by your advisor from other graduate programs.~~

- EMGT 5090 Special Topics (3)
- EMGT 5150 Leadership For Engineers (3)
- EMGT 5961 Introduction to Energy Systems (3)
- EMGT 5962 Energy Markets (3)
- EMGT 5963 Energy Systems Planning (3)
- EMGT 5964 Case Studies in the Energy Industry (3)
- EMGT 6090 Special Topics (3)
- EMGT 6142 Quality & Manufacturing Mgmt (3)
- EMGT 6901 Advanced Project Management (3)
- EMGT 6902 Legal Issues in Engineering Management (3)
- EMGT 6904 Product and Process Design (3)
- EMGT 6905 Designed Experimentation (3)
- EMGT 6906 Processing Systems Simulation (3)

- EMGT 6910 Technological [Forecasting and](#) Decision-Making (3)
- EMGT 6912 Techniques and Intelligent Tools for Engineering Decision Support (3)
- EMGT 6915 Engineering Decision [and Risk](#) Analysis (3)
- EMGT 6920 Logistics Engineering & Mgmt (3)
- EMGT 6930 Capital Cost Estimating (3)
- EMGT 6950 Engineering Systems Integration (3)
- EMGT 6952 Engineering Systems Optimization (3)
- EMGT 6955 Systems Reliability Engineering (3)
- EMGT 6985 Engineering Management Project (3)
- [EMGT 6924 Lean Practice and Management](#) (3)
- EMGT ~~6090~~ [6926](#) Lean Supply Networks (3)
- EMGT 6090 Financial Management for Global Engineering Operations (3)

Two relevant [g](#)Graduate courses from other programs may be taken as elective courses for the engineering management degree with approval of the [SEEM](#) program ~~director~~. [Courses completed from other departments as part of the MSEM concentrations would count towards the two allowed electives.](#) Students are responsible for fulfilling the prerequisites of the courses they plan to take from other graduate programs.

The following are recommended [MBAD](#) courses for electives:

- [MBAD 6141 Operations Management](#) (3)
- [MBAD 6161 Org Leadership & Behavior I](#) (3)
- [MBAD 6164 Executive Communications](#) (3)
- [MBAD 6195 A Strategic Management of Technology](#) (3)

Note: Students are required to have adequate preparation prior to taking the required [MBAD](#) (Master in Business Administration) courses. Traditionally, this consists of at least completing courses in engineering economics, foundations of economics, and mathematics through differential and integral calculus. Students are advantaged by having completed courses in foundations of accounting and statistics.

Admission to Candidacy Requirements

Each student is required to submit a Plan of Study to the Department's Graduate Director. Upon completion of a substantial amount of the graduate work, each student must file an Admission to Candidacy form to the Graduate School by the filing date specified in the University Calendar.

Application for Degree

Students preparing to graduate must submit an online Application for Degree by the filing date specified in the University Calendar. If a student does not graduate in the semester identified on the Application for Degree, then the student must update his/her Admission to Candidacy and submit a new Application for Degree for graduation in a subsequent semester.

PROPOSED CATALOG COPY OF COURSES

(Only affected course descriptions are listed below)

EMGT 5090. Special Topics. (1-6) Directed study of current topics of special interest. May be repeated for credit. (*On demand*)

EMGT 5150: Leadership Skills for Engineers (3) Prerequisite: Junior standing. Overview of the skills needed to practice the most popular leadership styles in industry today. The first half of the course covers an introduction to the different styles of leadership and how they are applied by Engineers within an organization. The second half of the course covers the critical leadership skills and competencies needed to build and lead powerful teams in a global environment.

EMGT 5961: Introduction to Energy Systems (3) Prerequisite: Junior standing, Basic math, economics, or consent of instructor. Overview of energy systems: energy types, generation, conversion, storage, transportation/transmission, and utilization. Principles, physical structure, processes, and utilization of fossil fuel, nuclear, and renewables for transportation, thermal, and electrical energy generation are discussed along with associated performance metrics. The course also provides an introduction to environmental impacts of energy production, life-cycle analysis, energy efficiency concepts and metrics, transmission systems, grid reliability, and the impact of smart grid technologies. All topics are presented in the context of industry standards as well as federal and state regulations.

EMGT 5962: Energy Markets (3) Prerequisite: Basic math and economics or consent of instructor. SEGR 4961/EMGT 5961 Introduction to Energy Systems or ECON 5181 Energy and Environmental Economics. Corequisite: If students have not completed SEGR 4961/EMGT 5961 Introduction to Energy Systems or ECON 5181 Energy and Environmental Economics, they should enroll in one of these courses concurrently with this one. Energy and power systems in regulated and competitive environments and implications on business decisions for firms in these industries. Topics include: mechanism of energy markets; comparative market systems; determination of prices under different market structures; gas, oil, coal, and electricity market architecture; electricity market design; dispatch and new build decisions; smart grid and renewable energy in electricity markets; risk and risk management in energy including demand and price volatility and use of financial derivatives; and the impact of financial market trends and current and proposed policies on the energy industry.

EMGT 5963: Energy Systems Planning (3) Prerequisite: Basic math and economics or consent of instructor. SEGR 4961/EMGT 5961 Introduction to Energy Systems. Corequisite: If students have not completed SEGR 4961/EMGT 5961 Introduction to Energy Systems, they

should enroll in one of these courses concurrently with this one. Recommended: SEGR 4962/EMGT 5962: Energy System Economics. Optimal planning of resources, logistics, distribution and storage in the end to end energy value chain from upstream natural gas production through mid-stream transportation & storage to downstream power generation, utility distribution and consumption. Smart Grid Optimization. Supplier and customer relationship management, contracts management. Lean-Six Sigma energy system process design. Power systems reliability and control, preventive maintenance, predictive maintenance, process and service quality control.

EMGT 5964: Case Studies in the Energy Industry (3) Prerequisite: Basic math and economics or consent of instructor. SEGR 4961/EMGT 5961 Introduction to Energy Systems. Corequisite: If students have not completed SEGR 4961/EMGT 5961 Introduction to Energy Systems, they should enroll in one of these courses concurrently with this one. Recommended: SEGR 4962/EMGT 5962: Energy System Economics. This course will introduce students to interpret and analyze real world business cases in the energy sector. Cases will explore the concepts behind natural monopolies, utility ownership, regulation & de-regulation, utility rates and service standards. Additionally, economic concepts such as supply & demand, market pricing, producer surplus, monopolistic pricing and ratemaking (regulatory goals, revenue requirements and the rate base and rate cases) will be applied. Some of the cases will explore decision-making strategies surrounding marginal prices, congestion management, congestion revenue, electric and gas transmission rights both in terms of physical versus financial markets, locational marginal prices (LMP), financial transmission rights in terms of revenue adequacy and auction revenue rights and typical energy trading hedging practices.

EMGT 6910. Technological Forecasting and Decision-Making. (3) Prerequisite: Permission of instructor. This course covers several techniques for engineering product design, development and improvement. A variety of decision making techniques such as several forecasting methods and quality function deployment are discussed specifically in the context of systems engineering applications, based on engineering design philosophy of cross- functional cooperation in order to create high quality products. Students will learn how to use these techniques for making effective engineering decisions in a technological environment. (*On demand*)

EMGT 6915. Engineering Decision and Risk Analysis. (3) Prerequisites: Integral and Differential Calculus, Statistics, Probability or permission of instructor. This course aims to provide some useful tools for analyzing difficult decisions and making the right choice. After introducing components and challenges of decision making, the course will proceed with the discussion of structuring decisions using decision trees and influence diagrams. Decision making under uncertainty will be emphasized including maximax, maximin, and minimax regret techniques. Modeling of different risk attitudes based on risk and return tradeoffs will be analyzed through utility theory. Finally, decisions under conflicting objectives and multiple criteria will be discussed along with some introduction to game theory. (*On demand*)

EMGT 6924. Lean Six Sigma Practice and Management. (3) This course is aimed to provide an understanding of the lean six sigma system design principles and tools. The course discusses the lean continuous improvement cycle starting with 1. defining value using tools such Quality Function Deployment, 2. proceeds with identifying value streams using Value Stream Mapping,

3. making the value stream flow through the elimination of 7 wastes, line balancing, 5S, cellular layouts, SMED, 4. pulling resources JIT based on demand and 5. achieving perfection through Kaizen events and statistical process control. Six Sigma improvement cycles DMAIC (Define, Measure, Analyze, Measure and Control) and DMADV (Define, Measure, Analyze, Design and Verify) are also discussed and synergies with lean principles are reviewed to create a lean six sigma system. The students are exposed to industry cases from major companies that illustrate the challenges and best practices of implementing a lean six sigma system. *(On demand)*

EMGT 6926. Lean Supply Networks. (3) The main objective of this course is to build fundamental lean systems skills to effectively design, plan and execute lean supply networks that deliver value to customers. With the ongoing global pressure of cost cutting and quality focus, many companies have been implementing “lean manufacturing” concepts to survive in this competitive marketplace. While this is a good start, lean concepts need to be implemented beyond the four walls of a company across its supply chain. Lean principles do not only apply to manufacturing but to service organizations as well. This course will help you understand the principles of lean, supply chain management, and provide you with the related tools and techniques to make supply chains and companies deliver goods and services successfully. The students are exposed to industry cases from major companies that illustrate the challenges of managing lean supply networks. *(On demand)*

- b. If overall proposal is for a new degree program that requires approval from General Administration, please contact the facultygovernance@uncc.edu for consultation on catalog copy.

N/A

- 4. ACADEMIC PLAN OF STUDY (UNDERGRADUATE ONLY): Please indicate whether the proposed change will impact an existing Academic Plan of Study and require changes to CAPP. If so, provide an updated Academic Plan of Study in template format (Academic Plan of Study templates can be found online at provost.uncc.edu/resources-and-reports).

N/A

- 5. STUDENT LEARNING OUTCOMES: Please indicate what SLOs are supported by this course or courses or whether this curricular change requires a change in SLOs or assessment for the degree program.

N/A

- 6. TEXTBOOK COSTS: It is the policy of the Board of Governors to reduce textbook costs for students whenever possible. Have electronic textbooks, textbook rentals, or the buyback program been considered and adopted?

Electronic textbooks are offered as options for many of the required texts. Based on the relative small quantity of required texts in the program, textbook rental is likely not available.

EMGT 6964: Case Studies in the Energy Industry course is planning to leverage case studies which are available in electronic format.

IMPORTANT NOTE: A Microsoft Word version of the final course and curriculum proposal should be sent to facultygovernance@uncc.edu upon approval by the Undergraduate Course and Curriculum Committee and/or Graduate Council chair.

Appendix : Syllabi for New Courses

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The William States Lee College of Engineering
Systems Engineering and Engineering Management

EMGT 5150: Leadership Skills for Engineers

Course Description:

Overview of the skills needed to practice the most popular leadership styles in industry today. The first half of the course covers an introduction to the different styles of leadership and how they are applied by Engineers within an organization. The second half of the course covers the critical leadership skills and competencies needed to build and lead powerful teams in a global environment.

Instructor: Dr. Jonathan Mayhorn

Phone: (704) 687-1957

FAX: (704) 687-3616

E-mail: jpmayhor@uncc.edu

Office: CARC 218 **Office Hours:** TBA

Prerequisite: Junior Standing. **Required Textbook:** None

Supplementary Materials: Lecture notes will be provided through the course web-site on Moodle.

Learning Objectives:

After completion of this course you will be able to:

1. Recognize the four major leadership styles used in industry today
2. Find the leadership style that works for you
3. Prepare for the future of the workforce
4. Build and lead powerful teams even in a global environment
5. Learn how to communicate effectively using influence
6. Continually develop your leadership style and improve your skills
7. Have the ability to use leadership coaching to improve yourself and others

Course Topics

- Transactional Leadership
- Transformational Leadership
- Situational Leadership
- Strategic Leadership
- Critical Leadership Competencies in the Global Environment
- Building and Leading Powerful Teams
- Using Coaching for Improved Work Performance

Course Policies, Requirements and Assessment:

Tests- Two exams will be given. No make-up exams are given so make every effort to attend the exams.

Project- Students will work in teams of three people to complete one project over the course of the semester. Students can choose one applied topic relating to Global Leadership within Systems Engineering and write a proposal, final report, and slides to be presented in front of the class during the final exam time (TBD). Some possible topics include but are not limited to: “Strategic Leadership in the Global Environment”, “Utilizing Transformational Leadership in the Workplace”, and “Leading Global Teams”, “Becoming a Successful Engineering Leader”. Final deliverables will include:

- 1) Electronic copy of the proposal & final report
- 2) Electronic copy of the slides the team will present
- 3) Actual presentation of the slides to the class

Assignments- Students will be required to complete assignments throughout the semester relating to the course topics. Assignments are to be completed and returned on the assigned day and time in order to be graded for credit. Late homework assignments will not be graded. Students should only work on assignments independently. The only exceptions to working on assignments independently will be when the instructor specifies that it is a group assignment or project.

Attendance (10% of your Grade)

- 0 to 1 absences =10%
- 2 absences = 8%
- 3 absences=6%
- 4 absences=4%
- 5 absences=2%
- 6 or more absences=0%

Class Attendance & Participation- To further the learning process on the topics covered, students are expected to participate in discussions both in the classroom and through Moodle. Students are also expected to attend all classes and log in to Moodle to take part in any further discussion topics posted by the instructor. It is each student’s responsibility to approach the instructor to make up for any missed classes. If you have legitimate documentation then the absence will not count towards your total number of missed days (examples include: a doctor’s note, funeral, or job interview).

Graduate credit: Graduate and undergraduate sections will be taught jointly, but obtaining graduate credit will require additional assignments on the homework, project, and exams.

Overall Grading Policy

Exam #1	20%
Exam #2	20%
Assignments	15%
Team Project	35%
Attendance & Participation	10%
<hr/>	
Total=	100%

UNCC Code of Student Academic Integrity: (<http://www.legal.uncc.edu/policies/ps-105.html>)

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The William States Lee College of Engineering
Systems Engineering and Engineering Management

EMGT 5961: Introduction to Energy Systems

Course Description:

Overview of energy systems: energy types, generation, conversion, storage, transportation/transmission, and utilization. Principles, physical structure, processes, and utilization of fossil fuel, nuclear, and renewables for transportation, thermal, and electrical energy generation are discussed along with associated performance metrics. The course also provides an introduction to environmental impacts of energy production, life-cycle analysis, energy efficiency concepts and metrics, transmission systems, grid reliability, and the impact of smart grid technologies. All topics are presented in the context of industry standards as well as federal and state regulations.

Instructor: Prof. Badrul H Chowdhury

Phone: (704) 687-1960

FAX: (704) 687-5588

E-mail: b.chowdhury@uncc.edu

Office: EPIC 1162 **Office Hours:** TBA

Prerequisite: Basic math, economics, or consent of the instructor.

Required Textbook

Energy Systems Engineering: Evaluation and Implementation, 2nd Edition, by Francis Vanek, Louis, D. Albright, Largus Angenent, McGraw-Hill, 2012.

Reference Textbooks

1. Energy and the Environment, 2nd Edition, by Robert A. Ristinen, Jack P. Kraushaar, December 2005, Wiley & Sons.
2. Alternative Energy Resources: The Quest for Sustainable Energy, by Paul Kruger, March 2006, Wiley & Sons.
3. Sustainable Energy: Choosing Among Options, by J. W. Tester, E. M. Drake, M. W. Golay, M. J. Driscoll, and W. A. Peters, 2005, MIT Press, Cambridge, MA.

Supplementary Materials: Lecture notes will be provided through the course web-site on Moodle.

Learning Objectives:

After completing the course, the students will be able to

1. Have a working knowledge of the various forms of energy usage and their impact
2. Understand energy systems design from an engineering perspective
3. Understand life cycle economics of energy systems
4. Understand how systems design is changing the way we generate, convert, deliver and use energy.
5. Understand how policies can impact the use of energy.

Course Contents & Tentative Schedule

	Topic	Lectures
1	Introduction to Energy Systems; conventional/fossil-based energy sources	2
2	Alternative energy sources (nuclear, fuel cell technologies, advanced engines, dish/Stirling engines): design and economics	2
3	Renewable energy sources (solar photovoltaics, solar thermal, CSP, wind, biomass, geothermal, ocean, tide, etc.): design and economics	4
4	Historical development of energy resources	1
5	Power vs. energy; units of energy; performance metrics	1
6	Basic energy economics (supply/demand considerations, time value of money, cash flow analysis, cost estimation, project evaluation, life cycle analysis)	3
7	Energy storage	2
8	Economics of energy production, transportation, storage and utilization	3
9	Energy management; sustainability	1
10	Energy utilization (electricity, transportation, heating/cooling, etc.)	2
11	Cyberphysical systems; Smart Grid/microgrid and impact on energy utilization	1
12	Energy efficiency in homes, businesses, buildings and industry	2
13	Environmental impact of energy production, transportation, and utilization; climate change; solutions for decarbonization	2
14	Federal and State policies regulations and standards in energy production and distribution	2

Course Policies, Requirements and Assessment:

1. **Exams:** There will be two exams during the semester. There will be no final exam. In lieu of the exam, you will have to turn in a term paper and present your findings in front of the class. Exams will be closed book unless otherwise announced. You may bring a calculator to tests.
2. **Absences:** Studies have shown that a student's performance in class deteriorates with multiple absences. Absence is therefore discouraged.
3. **Excused absence:** A medical certificate will be required to make up a test because of absence from a test due to illness. For absences from tests or quizzes because of plant trips, you will need to provide some documentation or proof, 24 hours in advance, that you will be going on a plant trip. Usually a travel itinerary from the company or a copy of the ticket is sufficient.
4. **Homework** is due on the second class period after the assigned date unless otherwise announced. For some assignments, students will be working in groups, but Individual Assignments should be completed independently. Students who plagiarize from other sources

or hand in assignments identical to or copied from others (except for assignments submitted as a group) will be violating scholastic honesty regulations and will not receive credit and will be subject to university's procedures and policies! You must submit all work in class before class begins on the date the homework is due. If you wish to submit your work early, you may certainly do so in person.

5. I will try my best to return all graded homework/quizzes/tests in a timely manner. The Final Exam will not be returned. You are, however, allowed to see your exam after grading is completed.
6. If you wish to discuss the grade received on homework/tests, you will have 4 weeks from the date of the homework submission or the date of the test to do so. After that, no change will be made on the grade. You will have a full semester after the date of the final exam to ask to see the final. However, the review must be done in person.
7. You are encouraged to visit with me during office hours. If you have a conflict with my posted hours, please call for an appointment. Email exchanges are always encouraged.
8. **Graduate credit:** Graduate and undergraduate sections will be taught jointly, but obtaining graduate credit will require additional assignments on the homework, project, and exams.

Grading Policy:

Exam I	20%
Exam II	20%
Term Project and Presentation	25%
Homework	20%
Attendance and Participation	15%

The Code of Academic Integrity:

See UNCC Code of Student Academic Integrity at <http://www.legal.uncc.edu/policies/ps-105.html>

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The William States Lee College of Engineering
Systems Engineering and Engineering Management

EMGT 5962: Energy Markets

Course Description:

Energy and power systems in regulated and competitive environments and implications on business decisions for firms in these industries. Topics include: mechanism of energy markets; comparative market systems; determination of prices under different market structures; gas, oil, coal, and electricity market architecture; electricity market design; dispatch and new build decisions; smart grid and renewable energy in electricity markets; risk and risk management in energy including demand and price volatility and use of financial derivatives; and the impact of financial market trends and current and proposed policies on the energy industry.

Instructor: Prof. Badrul H Chowdhury + Adjunct faculty members

Phone: (704) 687-1960

Fax: (704) 687-5588

E-mail: b.chowdhury@uncc.edu

Office: EPIC 1162 **Office Hours:** TBA

Prerequisite: Basic math and economics or consent of instructor. SEGR 4961/EMGT 5961 Introduction to Energy Systems or ECON 5181 Energy and Environmental Economics.

Corequisite: If students have not completed SEGR 4961/EMGT 5961 Introduction to Energy Systems or ECON 5181 Energy and Environmental Economics, they should enroll in one of these courses concurrently with this one.

Required Textbook: None

Reference Textbooks:

4. *Power System Economics: Designing Markets for Electricity*, Steven Stoft, May 2002, Wiley-IEEE Press, ISBN: 978-0-471-15040-4
5. *Energy Markets: Price Risk Management and Trading* (Wiley Finance), Tom James, December, 2007, Wiley; ISBN-13: 978-0-470-82225-8
6. *Power Markets and Economics: Energy Costs, Trading, Emissions*, Barrie Murray, March 2009, ISBN: 978-0-470-77966-8
7. *Operation of Restructured Power Systems*, Bhattacharya, Bollen, Daalder. Kluwer Academic Press, 2001.
8. *Fundamentals of Power System Economics*, D. Kirschen, G. Strbac, John Wiley & Sons, Ltd., 2004.
9. *International Energy Markets: Understanding Pricing, Policies and Profits*, Carol A. Dahl, Pennwell Corp , March 2004, ISBN: 978-0878147991
10. *Understanding Today's Electricity Business*, John Ferrare and Bob Shively, Enerdyanics, San Francisco, 2008
11. *Investing in Energy*, Gianna Bern, Bloomberg Press, 2011

Supplementary Materials: Lecture notes will be provided through the course web-site on Moodle.

Learning Objectives:

After completing the course, the students will be able to

6. Have a working knowledge of the mechanisms of energy markets
7. Understand supply and demand dynamics
8. Understand marginal cost
9. Understand electricity market economics and the constitution of locational marginal price
10. Understand the impact of transmission congestion on pricing
11. Understand risk management policies.

Course Contents & Tentative Schedule:

	Topic	Lectures
1	Introduction to energy and the economy, wealth, and human prosperity	1
2	Energy value chains; energy costing – cost decomposition, time value of money, cost estimation, levelized cost	2
3	Review of microeconomics – marginal costs, cost curves, supply/demand	1
4	Fuel markets (coal, gas, oil, refined products, uranium, etc.) – costs, structure (with introduction to types of markets - spot, forwards, futures), pricing mechanisms, policy, supply/demand outlook	2
5	Power generation costs – fossil, nuclear, and renewable technologies, transmission and distribution	3
6	Generation stack, marginal price of electricity, dispatching	2
7	Comparative power market designs – regulated, deregulated, open, managed	3
8	Market architecture: day-ahead, hour ahead, and real-time markets; ancillary services markets	2
9	Transmission congestion; transmission rights	2
10	Distribution system markets	2
11	Risk in the electric power industry – types of risk (project, market, commodity, etc.) and mechanisms to manage risk, including financial derivatives	2
12	Investing in energy - project evaluation, customer and investor perspectives	2
13	Regulated utility economics: rate cases, allowed return, impact on decision-making	2
14	Externalities, emissions regulations, emissions markets, and impact on generation choices	2

Course Policies, Requirements and Assessment:

9. **Exams:** There will be two exams during the semester. There will be no final exam. In lieu of the exam, you will have to turn in a term paper and present your findings in front of the class. Exams will be closed book unless otherwise announced. You may bring a calculator to tests.
10. **Absences:** Studies have shown that a student's performance in class deteriorates with multiple absences. Absence is therefore discouraged.
11. **Excused absence:** A medical certificate will be required to make up a test because of absence from a test due to illness. For absences from tests or quizzes because of plant trips, you will

need to provide some documentation or proof, 24 hours in advance, that you will be going on a plant trip. Usually a travel itinerary from the company or a copy of the ticket is sufficient.

12. **Homework** is due on the second class period after the assigned date unless otherwise announced. For some assignments, students will be working in groups, but Individual Assignments should be completed independently. Students who plagiarize from other sources or hand in assignments identical to or copied from others (except for assignments submitted as a group) will be violating scholastic honesty regulations and will not receive credit and will be subject to university's procedures and policies! You must submit all work in class before class begins on the date the homework is due. If you wish to submit your work early, you may certainly do so in person.
13. I will try my best to return all graded homework/quizzes/tests in a timely manner. The Final Exam will not be returned. You are, however, allowed to see your exam after grading is completed.
14. If you wish to discuss the grade received on homework/tests, you will have 4 weeks from the date of the homework submission or the date of the test to do so. After that, no change will be made on the grade. You will have a full semester after the date of the final exam to ask to see the final. However, the review must be done in person.
15. You are encouraged to visit with me during office hours. If you have a conflict with my posted hours, please call for an appointment. Email exchanges are always encouraged.
16. **Graduate credit:** Graduate and undergraduate sections will be taught jointly, but obtaining graduate credit will require additional assignments on the homework, project, and exams.

Grading Policy:

Exam I	20%
Exam II	20%
Term Project and Presentation	25%
Homework	20%
Attendance and Participation	15%

The Code of Academic Integrity:

See UNCC Code of Student Academic Integrity at <http://www.legal.uncc.edu/policies/ps-105.html>

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The William States Lee College of Engineering
Systems Engineering and Engineering Management

EMGT 5963: Energy Systems Planning

Course Description:

Optimal planning of resources, logistics, distribution and storage in the end to end energy value chain from upstream natural gas production through mid-stream transportation & storage to downstream power generation, utility distribution and consumption. Smart Grid Optimization. Supplier and customer relationship management, contracts management. Lean-Six Sigma energy system process design. Power systems reliability and control, preventive maintenance, predictive maintenance, process and service quality control.

Co-Instructors: Srijib Mukherjee, Ph.D., P.E. and Fred D'Ambrosio, P.E.

Phone (Srijib): (919) 538-5348

E-mail: smukherjee@quanta-technology.com

Phone (Fred): (832) 279-4278

E-mail: fdambrosio@hess.com

Office: TBD, **Office Hours:** TBD

Prerequisite: Basic math and economics or consent of instructor. SEGR 4961/EMGT 5961 Introduction to Energy Systems.

Corequisite: If students have not completed SEGR 4961/EMGT 5961 Introduction to Energy Systems, they should enroll in one of these courses concurrently with this one.

Recommended: Students are also encouraged to take SEGR 4962/EMGT 5962: Energy System Economics.

Textbook: TBD

Format:

- Research Assignments: Literature review of an energy topic – selected topics to support an area of interest, 5 one page written papers.
- Tests: Mid-Term & Final (take-home, individual effort)
- Term Project: “Value Creation Project” based on existing global and US domestic energy opportunities

Learning Objectives:

Upon completion of the course the students will be able to:

1. Understand the natural gas – electric power value chain, its components and how value is created maintained and protected through the chain.
2. Articulate on the primary sources of natural gas, how is it produced, transported and stored through pipelines, and its consumption in power generation or as a direct energy source.
3. Articulate on the primary sources of fuel for electric generation, how is it produced, transported through transmission and distribution facilities.
4. Understanding the basics of retail gas and electric through smart grid optimization
5. Deal with Energy market dynamics – physical versus financial and how to utilize both to maximize efficiency reliability while managing risk
6. Understand the regulatory requirements imposed on both a state and federal level and the impact of de-regulation across the value chain.
7. Understand the basics of risk with respect to Energy markets
8. Identify “lean” manufacturing processes applicable to energy production
9. Understand “alternate”/“renewable” energy sources and their applications

Course Contents & Tentative Schedule

High Level Discussion Areas	Topics	Description	Weeks
Introduction			1-2
Design (long term-strategic, time scale: quarters - years)	Network Design	Population density study, purchasing of land and land rights, construction permits and environmental assessments, electric distribution and retail load planning (Location decisions for facilities, terminals, plants, pipelines, wells, transmission lines, etc. given supply and demand points)	2-4
	Smart Grid Optimization	Retail Distribution through Smart Grid Optimization – Natural Gas and Electric/Business & Data Analytics, Smart Metering, Demand Response	5
	Supplier Selection	Gas and utility supplier selection, equipment supplier selection, service supplier selection	6
	Contract Management	Long term contracts, short term and bilateral contracts	6-7

	Outsourcing	Substation engineering, gas production facilities, restoration/maintenance services	7
	Design for Green	Impact to carbon footprint, energy efficiency, emission issues, Regulatory review – State & Federal Regulatory oversight; the process of de-regulation and its impact along the value chain, gas fracking	8
	Customer Segmentation	Large scale industrial, commercial, retail customers, residential customers	8
Exam 1			9
Planning (near term - tactical, time scale: wks to months)	ERP-Enterprise Resource Planning	How technology is integrated back to billing and purchasing also known as “Enterprise Service Oriented Architecture”	10
	Demand Planning	Energy Consumption – retail energy markets, consumer supply and demand patterns, market pricing and efficiency, home area networks (Forecasting)	11
	Supply Planning	Natural Gas – capacity, production & storage, distribution & logistics Electric – generation resource planning, production planning, storage systems planning (such as battery, fly wheels, etc.) & logistics (production, capacity, resources, storage/inventory, distribution/transportation)	12
	Systems reliability and control	Preventive and predictive maintenance planning Maintenance in Fossil, Nuclear, and thermal generations. Bill of materials management for service parts (Additional gearboxes, spare circuit breakers, etc.)	13
Execution (short term-	Continuous	how Lean SixSigma system	14

operational, time scale: hrs - days	Improvement	strategies, developed and refined in traditional manufacturing operations have been incorporated into the energy industry.	
	Day to day operations	Operator decision based on economic dispatch Physical and Financial commodity markets as they apply to the utility industry. Daily capacity reservation mechanism for electric and gas (e.g. scheduling of production, transportation, maintenance, etc.)	15
Exam 2			16
Project Presentations			17-18

Course Requirements and Assessment:

1. **Tests:** There will be two exams.

2. **Assignments:** Students will be required to do 5 assignments. Assignments must be returned on the specified due dates. Late homeworks are not allowed. For some assignments students will be working in groups, but Individual Assignments should be completed independently. Students who are plagiarizing from other sources or handing in assignments identical or copied from others (except for assignments submitted as a group) will be violating scholastic honesty regulations and will not receive credit and will be subject to university's procedures and policies!

3. **Term Project:** The students will work in teams (2-3 people) on an applied or theoretical project topic related to energy value chain planning. Each team will write a proposal and a final report and present their work during the last week of the class. Specific interests of students related to their job or research work will also be taken into account. Each team needs to follow the due dates for the project milestones and provide their respective project deliverables as indicated in the course schedule above. The final deliverables are 1) soft copy of the final report, 2) soft copy of the final presentation, 3) presentation in the class (an online synchronous session will be scheduled for this-details will follow).

4. **Class Attendance & Participation – Online Discussions:** For participation the students are expected to reply to questions/discussion questions every week 1) post replies to 3 of the posted lecture discussion questions every week, 2) write a follow-up (constructive) comment for at least one of the other classmates' postings every week, and 3) follow-up with the questions and responses every week. These postings (except for follow-ups) should be substantial in content having at least 100 words each. Due date for the participation is within a week's time from the posting date of the lecture discussion questions. Follow-up comment should be within 10 days

time from the posting date of the lecture discussion questions. Late postings will not receive participation points.

4. **Due dates for deliverables**: The dates above should be followed for deliverables unless they are changed by the instructors during the run of the course. Any change will be announced or indicated as the assignment is posted.

5. **Team Evaluations**: It is expected that each team member contributes to the group assignments and the term project. A team evaluation will be conducted for all group assignments and for the term project to ensure a balanced effort among the team members. In this evaluation each team member will evaluate themselves as well as the rest of the team members. The evaluations will be taken into account to identify the final grade for each team member at the end of the semester.

6. **Team Formation for group assignments**: For the group assignments and the project, we will form teams. If you have any preference please do let me know asap. I am going to facilitate the team formations taking into account your preferences. For this course, the recommended number of students in each team is 2-3.

7. **Graduate credit**: Graduate and undergraduate sections will be taught jointly, but obtaining graduate credit will require additional assignments on the homework, project, and exams.

Grading Policy:

Exam-I	15%
Exam-II	15%
Assignments	30%
Term Project	20%
Class Attendance & Participation	20%

Total	100%

The Code of Academic Integrity:

See UNCC Code of Student Academic Integrity at <http://www.legal.uncc.edu/policies/ps-105.html>

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The William States Lee College of Engineering
Systems Engineering and Engineering Management

EMGT 5964: Case Studies in the Energy Industry

Course Description:

This course will introduce students to interpret and analyze real world business cases in the energy sector. Cases will explore the concepts behind natural monopolies, utility ownership, regulation & de-regulation, utility rates and service standards. Additionally, economic concepts such as supply & demand, market pricing, producer surplus, monopolistic pricing and ratemaking (regulatory goals, revenue requirements and the rate base and rate cases) will be applied. Some of the cases will explore decision-making strategies surrounding marginal prices, congestion management, congestion revenue, electric and gas transmission rights both in terms of physical versus financial markets, locational marginal prices (LMP), financial transmission rights in terms of revenue adequacy and auction revenue rights and typical energy trading hedging practices.

Co-Instructors: Srijib Mukherjee, Ph.D., P.E. and Fred D' Ambrosio, P.E.

Phone (Srijib): (919) 538-5348 **E-mail:** smukherjee@quanta-technology.com

Phone (Fred): (832) 279-4278 **E-mail:** fdambrosio@hess.com

Office: TBD, **Office Hours:** TBD

Prerequisite: Basic math and economics or consent of instructor. SEGR 4961/EMGT 5961 Introduction to Energy Systems.

Corequisite: If students have not completed SEGR 4961/EMGT 5961 Introduction to Energy Systems, they should enroll in one of these courses concurrently with this one.

Recommended: Students are also encouraged to take SEGR 4962/EMGT 5962: Energy System Economics.

Textbook: None/Case studies and lecture notes will be supplied

Format: The class will use a variety of different formats, including online lectures through streaming video, in-class case discussions and solutions, in-class exercises and participation, assignments, projects and a final exam. To effectively master the material in this course, the student must “roll up your sleeves” and work in assigned groups.

Learning Objectives:

Upon completion of the course the student should be capable of:

1. Have an overview of the types of primary energy supply Utilities (electric and natural gas)

2. How Utilities operate in free markets and natural monopolies including privately owned, government owned and member owned.
3. Have an overview of both electric and gas industry regulation including both state and federal regulation.
4. Have a business understanding of the history and structure behind electric and gas de-regulation in the United States
5. Have an understanding of service standards including obligation to serve, continuity of service, quality of service, safety, cost efficiency, customer service and nondiscriminatory practices
6. Have an understanding of utility rate making through time of use rates, interruptible and curtailable rates.
7. Case studies that incorporate natural gas and electric market concepts which include the difference between physical and financial commodity markets and how they relate to one another, congestion management and locational marginal prices (LMP), and logistical optimization supporting utility purchasing practices

Course Contents:

Electric Industry – Cases and Exercises:

- Computation of locational marginal prices
- Energy wheeling in a discriminant market
- Wind and Energy – a case study of Texas
- Enron: The smallest guys in the room – case study
- Linear sensitivity exercises
- Congestion management exercises

Gas Industry – Cases and Exercises:

- Logistical optimization, transportation capacity storage utilization
- Price hedging to minimize market volatility
- Enron – an “Insider’s” view

Grading Policy:

- Individual Assignments/Exercises – 20%
- Team engagement and participation (to be evaluated by team mates) – 5%
- Class Participation via discussion board – 5%
- Group Cases – 50%
- Final Exam – 20%

Case Studies and Assignments:

The material for this course cannot be effectively mastered only by reading or listening in class. These are necessary, but not sufficient, activities. In order to master the case studies and assignments, team member contributions should reflect exceptional preparation. Arguments to the cases should be well substantiated and persuasively presented. The cases and the individual assignments are due in:

- Hard Copy

- In Class
- At the beginning of the class in which the case is discussed.
- Each team member should keep a copy of the case write-up for use during class discussion

Team Engagement and Class Participation: Team members will evaluate each other for fair contribution to group assignments. There will be a variety of opportunities to contribute to the class discussion specifically via a set up discussion board. Active participation in lectures via asking value added good questions, as well as contributions to the bulletin board will be credited.

Team Formation for group assignments: For the group assignments and the project, we will form teams. If you have any preference please do let me know asap. I am going to facilitate the team formations taking into account your preferences. For this course, the recommended number of students in each team is 2-3.

Graduate credit: Graduate and undergraduate sections will be taught jointly, but obtaining graduate credit will require additional assignments on the homework, project, and exams.

The Code of Academic Integrity:

See UNCC Code of Student Academic Integrity at <http://www.legal.uncc.edu/policies/ps-105.html>

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The William States Lee College of Engineering
Engineering Management Graduate Program

EMGT 6924: Lean Six Sigma Practice and Management

Course Description:

This course is aimed to provide an understanding of the lean six sigma system design principles and tools. The course discusses the lean continuous improvement cycle starting with 1. defining value using tools such Quality Function Deployment, 2. proceeds with identifying value streams using Value Stream Mapping, 3. making the value stream flow through the elimination of 7 wastes, line balancing, 5S, cellular layouts, SMED, 4. pulling resources JIT based on demand and 5. achieving perfection through Kaizen events and statistical process control. Six Sigma improvement cycles DMAIC (Define, Measure, Analyze, Measure and Control) and DMADV (Define, Measure, Analyze, Design and Verify) are also discussed and synergies with lean principles are reviewed to create a lean six sigma system. The students are exposed to industry cases from major companies that illustrate the challenges and best practices of implementing a lean six sigma system.

Instructor: Professor Ertunga C. Ozelkan (Dr. Oz)

Phone: (704) 687-1952

FAX: (704) 687-3616

E-mail: Ertunga.Ozelkan@UNCC.edu

URL <http://seem.uncc.edu/faculty-directory/23-ozelkan-ertunga-c.html>

Office: Cameron 204

Communication Platform: The primary communication platform for this course is Moodle.

Office Hours: xxday 3-4pm in person, online or on the phone (704) 687-1952 or by appointment.

Prerequisite: Basic Statistics and Calculus or Consent of the Instructor.

Textbook: The Lean Six Sigma Pocket Toolbook by Michael L. George, John Maxey, David Rowlands, Mark Price, McGraw-Hill; 1 edition (August 1, 2004)

Supplementary Reference Books:

-The Machine That Changed The World, J. P. Womack, D. T. Jones, D. Roos, Harper Perennial Press 1990, ISBN 0-06-097417-6

-Lean Thinking, J. P. Womack, D. T. Jones, Free Press 1996, ISBN 0-7432-4927-5

-Supply Chain Management, Sunil Chopra and Peter Meindl, Second Edition, Prentice-Hall, 457 pp., 2001, ISBN 0-13-101028-X

- Lean Six Sigma for Service : How to Use Lean Speed and Six Sigma Quality to Improve Services and Transactions by Michael George, McGraw-Hill; 1 edition (June 27, 2003).

- Lean Six Sigma by Donna C. Summer, Prentice Hall; 1 edition (July 24, 2010)

Supplementary Materials: Other handouts and materials will be provided via Moodle.

Course Contents & Tentative Schedule at a Glance:

Weeks	Discussion	Topics	HW	Project Milestones
1	Introduction	Course Overview and Objectives Introduction to Lean Six Sigma		
2	Introduction	Introduction to Lean Six Sigma		
3	Define Value	VOC: QFD, Kano Model	1	proposal (extended abstract due)
4	Identify Value Stream	Value Stream Mapping, Swim Lanes, Waste Analysis		
5	Make it Flow	Line Balancing, Cell Layout, 5S, Standard Work, SMED	2	
6	Pull	Kanban, Heijunka,		
7	Perfection	Continuous Improvement - Kaizen	3	introduction, literature review submitted
8	Define	Project Charter		
8	Measure	SIPOC, Flow Charts, Repeatability & Reproducibility (R&R)	4	
9-12	Analyze	Relationship Modeling (Scatter plots, Run Charts, Pareto Analysis, Correlation, Regression), Process capability, Hypothesis Testing, Statistical significance, Analysis of Variance – ANOVA, Failure Mode and Effect Analysis – FMEA, Root-cause Analysis – Fishbone Diagrams, SWOT Analysis	5	model section and numerical analysis draft completed, due 10th week
13	Improve	Fail Safing-Poke Yoke, Cycle time Reduction, Constraint-based thinking-TO		Draft Project Report
14	Control	Statistical Process Control	6	Final Presentation submitted
15		Project Presentations		
16		Project Presentations		Final Project Report submitted

Main Learning Objectives:

After completing the course, the students will be able to

1. Understand principles of lean
2. Understand principles of six sigma
3. Understand the synergies of lean and six sigma
4. Understand how Lean Six Sigma principles can help to improve a company's performance
5. Apply techniques to design, plan and execute lean six sigma system.

Course Requirements and Assessment:

1. **Assignments:** Students will be required to do 5-6 assignments. Assignments must be returned on the specified due dates. Late submissions are not allowed. For some assignments students may be required to work in groups, but Individual Assignments should be completed independently. Students who are plagiarizing from other sources or handing in assignments identical or copied from others (except for assignments submitted as a group) will be violating scholastic honesty regulations and will not receive credit and will be subject to university's procedures and policies (please see note on Code of academic integrity below)!

2. **Term Project:** The students will work in teams (2-3 people) on an applied or theoretical project topic related to lean six sigma practice and management. Each team will write a proposal and a final report and present their work during the last week of the class. Specific interests of students related to their job or research work will also be taken into account. Each team will write a 1 page abstract as a proposal and a final report and present their work during the last week of the class. Each team needs to follow the due dates for the project milestones and provide their respective project deliverables as indicated in the course schedule above. The final deliverables are 1) soft copy of the final report, 2) soft copy of the final presentation, 3) online presentation.

3. **Class Attendance & Participation – Online Discussions:** For participation the students are expected to reply to questions/discussion questions every week 1) post replies to 3 of the posted lecture discussion questions every week, 2) write a follow-up (constructive) comment for at least one of the other classmates' postings every week, and 3) follow-up with the questions and responses every week. These postings (except for follow-ups) should be substantial in content having at least 100 words each. Due date for the participation is within a week's time from the posting date of the lecture discussion questions. Follow-up comment should be within 10 days time from the posting date of the lecture discussion questions. Late postings will not receive participation points.

4. **Due dates for deliverables:** The dates above should be followed for deliverables unless they are changed by Dr. Ozelkan during the run of the course. Any change will be announced or indicated as the assignment is posted.

5. **Team Evaluations:** It is expected that each team member contributes to the group assignments and the term project. A team evaluation will be conducted for all group assignments and for the term project to ensure a balanced effort among the team members. In this evaluation each team member will evaluate themselves as well as the rest of the team members. The evaluations will be taken into account to identify the final grade for each team member at the end of the semester.

6. **Team Formation for group assignments:** For the group assignments and the project, we will form teams. If you have any preference please do let me know asap. I am going to facilitate the team formations taking into account your preferences. For this course, the recommended number of students in each team is 2-3.

Grading Policy:

Assignments	60%
Term Project	20%
Class Attendance & Participation	20%

Total	100%

The Code of Academic Integrity:

See UNCC Code of Student Academic Integrity at <http://www.legal.uncc.edu/policies/ps-105.html>

THE UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

The William States Lee College of Engineering
Engineering Management Graduate Program

EMGT 6926: Lean Supply Networks

Course Description:

The main objective of this course is to build fundamental lean systems skills to effectively design, plan and execute lean supply networks that deliver value to customers. With the ongoing global pressure of cost cutting and quality focus, many companies have been implementing “lean manufacturing” concepts to survive in this competitive marketplace. While this is a good start, lean concepts need to be implemented beyond the four walls of a company across its supply chain. Lean principles do not only apply to manufacturing but to service organizations as well. This course will help you understand the principles of lean, supply chain management, and provide you with the related tools and techniques to make supply chains and companies deliver goods and services successfully. The students are exposed to industry cases from major companies that illustrate the challenges of managing lean supply networks

Instructor: Professor Ertunga C. Ozelkan (Dr. Oz)

Phone: (704) 687-1952

FAX: (704) 687-3616

E-mail: Ertunga.Ozelkan@UNCC.edu

URL <http://seem.uncc.edu/faculty-directory/23-ozelkan-ertunga-c.html>

Office: Cameron 204

Communication Platform: The primary communication platform for this course is Moodle.

Office Hours: xxday 3-4pm in person, online or on the phone (704) 687-1952 or by appointment.

Prerequisite: Basic Statistics and Calculus or Consent of the Instructor.

Textbook: Streamlined: 14 Principles for Building & Managing The Lean Supply Chain, M. M. Srinivasan, Thomson Press, ISBN: 0-324-23277-2

Supplementary Books:

-The Machine That Changed The World, J. P. Womack, D. T. Jones, D. Roos, HarperPerennial Press 1990, ISBN 0-06-097417-6

-Lean Thinking, J. P. Womack, D. T. Jones, Free Press 1996, ISBN 0-7432-4927-5

Supplementary Materials: Other handouts and materials will be provided through Blackboard.

Learning Objectives:

After completing the course, the students will be able to

1. Understand fundamental drivers of supply network performance
2. Understand how Lean principles can help to improve supply network performance
3. Apply techniques to design, plan and execute lean supply networks.

Course Contents & Tentative Schedule:

Weeks	Discussion	Topics	Recommended Reading	HW	Project
1	Lean Supply Networks: Fundamentals	Course Overview and Objectives Introduction to Lean	Ch 1		
2		Lean Process	Ch 5		1
3		Introduction to Supply Networks	Ch 1		
		Information Distortion in Supply Networks - Bullwhip Effect	Ch 2. p37		
4-5		Industry Supply Networks - Case Studies: Cisco, Dell, Walmart Improve your Supply Network - Constraint Based Thinking	Ch 6		2 proposal (extended abstract due)
6	Lean Supply Networks:	Supply Network Strategy	Ch 3, 4		
7		Strategic Sourcing			3
8		Distribution Network Design			introduction, literature review submitted
9	NO CLASS	STUDENT RECESS			
10	Lean Supply Networks: Planning	Demand Planning			4
11		Supply Planning	Ch 9		
12		Inventory Planning			model section and numerical analysis completed, 1st draft
13	Lean Supply Networks: Execution	Logistics Scheduling (as time permitted)	Ch 8		
14		Quality Management - Six Sigma in Supply Networks			6 Final Project Report
15		Project Presentations			Final Presentation submitted
16		Project Presentations			

Course Requirements and Assessment:

1. **Assignments:** Students will be required to do 5-6 assignments. Assignments must be returned on the specified due dates. Late submissions are not allowed. For some assignments students will be working in groups, but Individual Assignments should be completed independently. Students who are plagiarizing from other sources or handing in assignments identical or copied from others (except for assignments submitted as a group) will be violating scholastic honesty regulations and will not receive credit and will be subject to university's procedures and policies!

2. **Term Project:** The students will work in teams (2-3 people) on an applied or theoretical project topic related to lean supply networks. Each team will write a proposal and a final report and present their work during the last week of the class. Specific interests of students related to their job or research work will also be taken into account. Each team needs to follow the due dates for the project milestones and provide their respective project deliverables as indicated in the course schedule above. The final deliverables are 1) soft and hard copies of the final report, 2) soft copy of the final presentation, 3) presentation in the class.

3. **Class Attendance & Participation – Online Discussions:** For participation the students are expected to 1) post replies to at least 3 of the posted lecture discussion questions, 2) write a (constructive) comment for at least one of the other classmates' postings under at least two of the lecture discussion questions, and 3) follow-up with the questions and responses. These postings (except for follow-ups) should be substantial in content having at least 100 words each. Due date for the participation is within a week's time from the posting date of the lecture discussion questions. Late postings will not receive participation points.

4. **Due dates for deliverables:** The dates above should be followed for deliverables unless they are changed by Dr. Ozelkan during the run of the course. Any change will be announced or indicated as the assignment is posted.

5. **Team Evaluations:** It is expected that each team member contributes to the group assignments and the term project. A team evaluation will be conducted for all group assignments and for the term project to ensure a balanced effort among the team members. In this evaluation each team member will evaluate themselves as well as the rest of the team members. The evaluations will be taken into account to identify the final grade for each team member at the end of the semester.

6. **Team Formation for group assignments:** For the group assignments and the project, we will form teams. If you have any preference please do let me know asap. I am going to facilitate the team formations taking into account your preferences. For this course, the recommended number of students in each team is 2-3.

Grading Policy:

Assignments	50%
Term Project	25%
Class Attendance & Participation	25%

Total	100%
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The Code of Academic Integrity:

See UNCC Code of Student Academic Integrity at <http://www.legal.uncc.edu/policies/ps-105.html>

Appendix: Consultations



J. Murrey Atkins Library

Consultation on Library Holdings

To: Dr. Ertunga Ozelkan
From: Alison Bradley
Date: 1/16/13
Subject: MSEM Curriculum proposal

Summary of Librarian's Evaluation of Holdings:

Evaluator: Alison Bradley

Date: 1/16/13

Check One:

1. Holdings are superior _____
2. Holdings are adequate x
3. Holdings are adequate only if Dept. purchases additional items. _____
4. Holdings are inadequate _____

Comments:

Library holdings should be adequate to support student research for this proposed curriculum change. Since most of the proposed concentrations do not include new or heavily revised courses, current holdings will be sufficient. The new concentration in Energy Systems will be supported through the substantial purchasing commitment for EPIC and also funding for collections supporting the Belk College of Business. Students will have access to relevant databases including Compendex, Inspec, IEEE Xplore, Business Source Complete, and many others.

If new areas of research require additional purchasing support, faculty from the SEEM program should contact the librarian directly, as they do not have a faculty representative.

Alison Bradley

Evaluator's Signature

1/16/13

Date



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

Energy Production and Infrastructure Center (EPIC)

9201 University City Blvd, Charlotte, NC 28223-0001
t/ 704.687.1669 f/ 704.687.1819 www.epic.uncc.edu

January 30, 2013

Dr. Ertunga Ozelkan, Director
UNC Charlotte
Systems Engineering & Engineering Management
9201 University City Blvd.
Cameron 204
Charlotte, NC 28223-0001

Dear Dr. Ozelkan,

With this letter I would like to extend my full support for your proposal to establish an energy concentration under the systems engineering and engineering program. This concentration is well aligned with the energy research and education strategy of UNC Charlotte, the William States Lee College of Engineering and the Energy Production and Infrastructure Center – EPIC.

EPIC at UNC Charlotte was formed in response to the need from industry to supply highly trained engineers qualified to meet the demands of the energy industry – through traditional and continuing education, and provide sustainable support the Carolina energy industry by increasing capacity and support for applied research. EPIC is a highly collaborative industry/education partnership that produces a technical workforce, advancements in technology for the global energy industry while supporting the Carolinas' multi-state economic and energy security.

The proposed program will serve the Greater Charlotte Region which is a major energy hub in the Carolinas, hosting large utility and energy research companies. The need for systems engineers and engineering managers with skills geared towards the energy industry has been steadily increasing and your concentration is timely.

I also would like to add that Systems Engineering and Engineering Management is in a unique position combining engineering and management, thus I believe the proposed courses can be very beneficial to the business students as electives as well.

Sincerely,

Johan H-R. Enslin

Johan Enslin, Director
Energy Production and Infrastructure Center (EPIC)

The UNIVERSITY of NORTH CAROLINA at CHARLOTTE

An Equal Opportunity/Affirmative Action Employer



Revised 12/18/12
OAA/mjw

From: Amato, Christie
Sent: Monday, February 11, 2013 2:57 PM
To: Ozelkan, Ertunga; Troyer, Jennifer; Schwarz, Peter; Chowdhury, Badrul
Cc: Enslin, Johan; Bhatt, Ronak; Kohut, Gary
Subject: RE: MSEM Curriculum Revision - Consultation

Dear Ertunga,

Thank you for sharing the MSEM proposed curriculum revision. After consultation with the Economics, Business Information Systems and Operations Management and Finance departments as well as the MBA Director, we strongly support your proposal to establish MSEM concentration and revise the curriculum. We appreciate your consulting with us on these changes. Please let me know if you need anything further from the Belk College.

Best,
Christie

Christie H. Amato | Associate Dean for Graduate Programs & Professor
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