Graduate Program Review Committee
of the Graduate Council
MH 243
9:00 – 10:30 am
April 15, 2011

AGENDA

I. Welcome and call to order

II. Review of minutes from April 8th meeting

III. Review of Engineering Management M.S. Program Proposal

IV. Adjournment

COMMITTEE MEMBERS (2010-11)

Ahmad Elshennawy (CECS)
Karen Aroian (CON)
Michael Caputo (CBA)
Debopam Chakrabarti (COM)
H.G. Parsa (RCHM)
Harry Weger (COS)
Patrick LiKamWa (COP)
Paul Dombrowski (CAH, Chair of Committee)
Richard Gause (Libraries)
Mary Little (CED)
Patricia Bishop (Ex Officio, College of Graduate Studies)
Max Poole (Liaison from College of Graduate Studies)

Florida Board of Governors

Request to Offer a New Degree Program

University of Central Florida (UCF) University Submitting Proposal	Fall 2011 Proposed Implementation Date
College of Engineering & Computer Science Name of College or School	Industrial Engineering & Management Sys. Name of Department(s)
Engineering Management Academic Specialty or Field	Master of Science in Engineering Management - PSM (15.1501) Complete Name of Degree (Include Proposed CIP Code)

The submission of this proposal constitutes a commitment by the university that, if the proposal is approved, the necessary financial resources and the criteria for establishing new programs have been met prior to the initiation of the program.

Date Approved by the University Board of Trustees		President	Date
Signature of Chair, Board of Trustees	Date	Vice President for Academic Affairs	Date

Provide headcount (HC) and full-time equivalent (FTE) student estimates of majors for Years 1 through 5. HC and FTE estimates should be identical to those in Table 1. Indicate the program costs for the first and the fifth years of implementation as shown in the appropriate columns in Table 2. Calculate an Educational and General (E&G) cost per FTE for Years 1 and 5 (Total E&G divided by FTE).

Implementation Timeframe	Projected Student Enrollment (From Table 1)		Projected Program Costs (From Table 2)		
	HC	FTE	Total E&G Funding	Contract & Grants Funding	E&G Cost per FTE
Year 1	50	32.44	$202,183	$269,120	$6,233
Year 2	60	39.00			
Year 3	75	48.84			
Year 4	80	52.13			
Year 5	100	63.38	$244,641	$398,436	$3,860

Note: This outline and the questions pertaining to each section must be reproduced within the body of the proposal to ensure that all sections have been satisfactorily addressed.

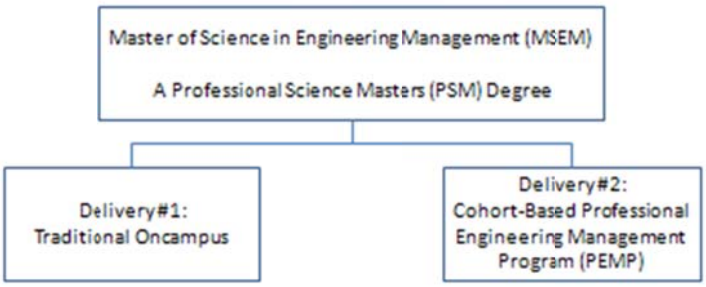
INTRODUCTION

I. Program Description and Relationship to System-Level Goals

A. Briefly describe within a few paragraphs the degree program under consideration, including (a) level; (b) emphases, including concentrations, tracks, or specializations; (c) total number of credit hours; and (d) overall purpose, including examples of employment or education opportunities that may be available to program graduates.

This request is to establish the Master of Science in Engineering Management (MSEM) degree as a Professional Science Master's program. It is currently a track within the Master of Science in Industrial Engineering. The key points of this proposal are:

- We are creating a standalone degree from an existing track within the IEMS MS program.
- This request is being made to formalize and create a stand-alone degree from an existing track within the Industrial Engineering & Management Systems Department (IEMS). Currently Engineering Management (EM) is a track within the Master of Science degree within IEMS. The EM track has been in existence since 1994. The EM track has been a productive degree offering with over 700 graduates.
- This request is being made based on:
  - An increased emphasis within the College and among the University's partners for a more formal Engineering Management degree.
  - The students from the cohort-based program pilot offerings have requested a more formal degree. We are responding to this feedback and request.
  - The increased demand for a Professional Science Master's (PSM) degree. Professional Science Master's programs require: (1) technical content, (2) professional content such as leadership, business skills, legal or regulatory skills, communication skills, etc., (3) an industry advisory board, and (4) an experiential learning experience
- The degree will be offered in two formats: traditional on-campus and professional, cohort-based. Both require 30 credit hours of courses.



The first mode is the traditional teaching mode of on-campus or webcourses based. The second mode is offered as a cohort offering targeted for working professionals who have at least 5 years of working experience. This cohort program is called the Professional Engineering Management Program (PEMP). This program is conducted as a cohort program at the UCF Regional Campuses. In this cohort-based program,

- The curriculum focuses on the organizational processes that an engineer interacts with when delivering a project. Each course focuses on delivering the understanding and skills necessary to operate within these core processes.
- A reflective learning approach focuses on developing the student's technical and reflective practitioner skills.
- The use of technology supports the delivery of the content—a combination of webcourse delivery and face-to-face case application sessions.

- The professional cohort-based track has already completed four cohorts with partners which include:
    - Cohort 1 with industrial partners of KSC, Lockheed Martin, Siemens, WDW, Boeing, CNL.
    - Cohort 2 with industrial partner Harris
    - Cohort 3 with industrial partner KSC
    - Cohort 4 with industrial partner Harris

- We have designed the MSEM degree so that it focuses on providing engineers and scientists the skills and knowledge to lead project teams. The degree provides the professional skills to round out the professional engineer or scientist to move beyond the core technical discipline of their undergraduate experience. By obtaining this degree the graduates will be more likely to be promoted to leadership positions within their organizations. Consistent with the requirements of the PSM, the MSEM degree provides skills and experiences in three areas:
    1) Technical courses
    2) Professional courses
    3) Experiential experiences.

- An industrial advisory board supports the development and refinement of the degree. The advisory board reviewed and refined the initial curriculum. They also provided support to the students to be part of the degree. They reviewed the degree's assessment data and validated our performance improvement plan. They continue to provide an industry perspective to the curriculum.
- The overall purpose of the program is to help engineers and scientists be successful in leading projects teams in the workplace. Example job titles include:
    - Project engineer
    - Project manager
    - Technical lead/supervisor
    - Systems engineer
    - Systems engineering manager.

The MSEM represents a strong degree. The degree meets the requirements for a new program:

1. The goals of the program are aligned with the university's mission and relate to specific institutional strengths.
    a. The program focuses on prominence in graduate education.
    b. The program builds from the strength of the long-standing EM track with the MS degree within the Industrial Engineering & Management Systems Department (IEMS).
2. The IEMS department has responded to the program reviews or accreditation recommendations.
    a. Related to this program, the IEMS department has responded to the need to restructure the graduate programs. This proposal represents part of that response.
    b. The program itself conducted an extensive program assessment from the first 2 cohorts of the PEMP. The program has responded with changes to the third and fourth cohorts.
3. The program has defined a set of courses across professional, science, and experiential experiences. This curriculum supports the program being a PSM and responds to the specific needs and educational objectives of the graduates. The degree can be accomplished in less than 2 years. The program will pursue accreditation by the American Society for Engineering Management.
4. The core faculty already exists within the IEMS department. The program leverages existing courses offered within IEMS. When appropriate faculty members are not available, we are partnering with faculty from other institutions as adjunct professors.
5. The existing library resources exist. No special laboratory space or equipment is needed.
6. The long history of the MS track within IEMS reflects the need. The recent four cohorts of the PEMP demonstrate the current need. Partners within Florida support the program (e.g., Lockheed Martin, Siemens Power Generation, Harris, KSC, Walt Disney World). There is no conflict with existing programs in the state.
7. The budget is realistic and provides a positive revenue to the University. The initial year's budget shortfall (which is a function of not getting the SCH until a year later) is covered from the additional revenue from the four previous cohorts of the PEMP.
8. The IEMS department and MS track in Engineering Management have been productive.

B. Describe how the proposed program is consistent with the current State University System (SUS) Strategic Planning Goals. Identify which goals the program will directly support and which goals the program will indirectly support. (See the SUS Strategic Plan at http://www.flbog.org/about/strategicplan/)

The program is consistent with SUS Strategic Planning Goals.

1) **Access to and production of degrees—Master's**
The MSEM will increase the number of master's degrees produced by providing a more visible and marketable degree. Currently there are 50 students in the existing track. With the approval of this program both on-campus and off, the numbers are expected to double over the next four years. As we discuss in more detail later, we expect the total number of degrees to grow through cohort and on-campus graduates:
   - 2011: 50
   - 2012: 60
   - 2013: 75
   - 2014: 80
   - 2015: 100.

2) **Meeting statewide professional and workforce needs for: economic development of emerging technologies and economic development of high-wage/high-demand jobs.**
The MSEM provides the unique skills to help engineers and scientists better: 1) identify and deliver innovative technologies that are emerging; and 2) grow the economic base of both their companies and the state. PSM programs have been established nation-wide to further workforce and economic development and to better prepare students for non-academic workforce needs, by combining both the technical and professional skills needed. Nationally, PSM programs are more likely to be located in high-tech regions along both the east and west coast of the US because of this synergy between education and workforce needs. The existing track has already been offered with industry-partners throughout central Florida, so clearly companies needing this expertise have been seeking this degree out for education of their employees.

   Example positions to be filled by the graduates include:
   - Project engineer
   - Project manager
   - Technical lead/supervisor
   - Systems engineer
   - Systems engineering manager.

3) Meeting community needs and fulfilling unique institutional responsibilities

The MSEM provides an educational program the technical, engineering community needs for sustained growth of their organizations. Organizations that are already participating in the degree include:

- Harris
- Siemens Power Generation
- Walt Disney World
- Boeing
- NASA/Kennedy Space Center
- Lockheed Martin.

These organizations reviewed and refined the initial curriculum. They also provided support to the students to be part of the degree. They reviewed the degree's assessment data and validated our performance improvement plan. They continue to provide an industry perspective to the curriculum.

As part of the implementation plan of this degree, we will reach out and market to further organizations. We will use the support from the first four cohorts as the basis for the marketing. Specific companies to pursue participation from include:

- LM Simulation and Information Systems
- Progress Energy
- OUC
- Northrop Grumman
- FISERV
- Prospects
- STRICOM
- NOCTSD
- Air Force
- National Reconnaissance Organization.

Letters of support from industry are provided in Appendix III.

INSTITUTIONAL AND STATE LEVEL ACCOUNTABILITY

II. Need and Demand

A. Need: Describe national, state, and/or local data that support the need for more people to be prepared in this program at this level. Reference national, state, and/or local plans or reports that support the need for this program and requests for the proposed program which have emanated from a perceived need by agencies or industries in your service area. Cite any specific need for research and service that the program would fulfill.

The need for this MSEM degree is defined by three sources:

1) Past and ongoing performance of the IEMS EM graduate track.
2) Projected job growth for Engineering and Natural Science Managers.
3) The overall performance of strategy and technical projects within the high-tech organizations found in Central Florida.

First, as shown in Figure 1, the UCF Engineering Management program is already a productive graduate degree. We are looking for this performance to continue and to grow given the new emphasis. The program had a long-standing cohort-based track with the Kennedy Space Center in the 1990s. We are building a program to re-establish cohort-based programs with leading engineering-based companies in Central Florida.

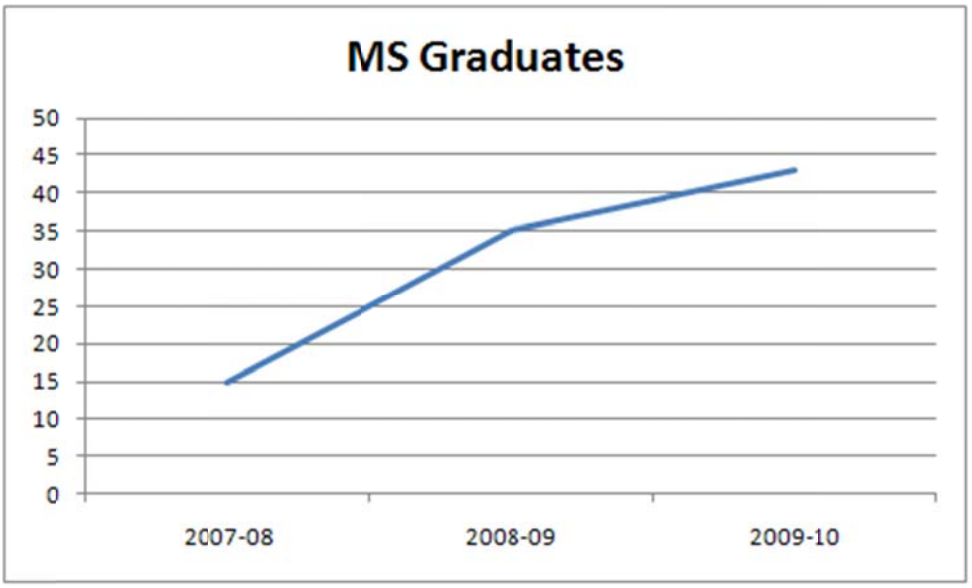


Figure 1. EM Degree Production

Second, as shown in Figure 2, the United States Department of Labor projects an increase in the need for engineering and natural science managers. The MSEM provides the training to supply the increase in the needs. The MSEM intends to provide these professional skills.

Occupational Title	SOC Code	Employment, 2008	Projected Employment, 2018	Change, 2008-18	
				Number	Percent
Engineering and natural sciences managers	—	228,700	246,900	18,200	8
Engineering managers	11-9041	184,000	195,400	11,300	6
Natural sciences managers	11-9121	44,600	51,500	6,900	15

Figure 2. The Projected Need for Engineering and Natural Science Managers
Taken from United States Department of Labor's Bureau of Labor Statistics Occupational Outlook Handbook, 2010-11 Edition (http://www.bls.gov/oco/ocos009.htm).

Third, there is a desperate need for individuals with training in engineering management who can lead organizations in successful project management. Organizations are implementing a strategic management process to drive performance. However, the results are not that promising. Beer and Nohria (2002) estimate that 70% of the change or improvement efforts fail. What this research shows us is that the strategy process is important. Therefore, the organization must:

- ***Ensure the organization's strategy is defined***. Strategy is the organization's response to the profit challenge. A "good" strategy needs to be defined to respond to the environment the organization is facing.
- ***Ensure the organization's strategy is implemented***. Once the strategy is defined, it must be implemented throughout the whole organization – not just at top-level.

From the organization's perspective, strategy should be implemented in both the core business projects the organization implements to meet customer needs, and it should also be implemented in the improvement projects it invests in to make the organization better.

To understand the need for a different perspective on the project-based organization, we look at the fundamental work of the project-based organization: projects. We need to improve how well projects are executed. The work of the Standish Group has shown that projects are not executed well. Figure 3 shows the ongoing trends in project success rates. As shown in this data, projects are not successful. To further understand what this means to the project-based organization we need to look at the costs these failures cause to the organization.

	1994	1996	1998	2000	2002	2004	2006
Succeeded	16%	27%	26%	28%	34%	29%	35%
Failed	31%	40%	28%	23%	15%	18%	19%
Challenged	53%	33%	46%	49%	51%	53%	46%

Figure 3. Summary of project success rates (Standish Group Chaos Studies)

These success rates have a profound impact on the performance of the project-based organization. Ideally a project's benefits outweigh the costs. The benefits are the projected business outcomes to be achieved by the successful implementation of the project. These benefits are what are used to sell the project or make the case for approving the project in the first place. The cost is usually defined by the direct cost of the project - the labor, materials, and sub-contracts related to the project. However, these costs are not the only costs of the project. As the project becomes challenged, the cost to the organization increases. First, the organization needs to add additional resources to right the project. Second, the organization invests dollars to make changes to the processes, tools, and people that led to the poor project quality. The dollars invested in the original cost of the project and the dollars associated with the cost of poor project quality takes resources away from other opportunities the organization could have pursued. Therefore, the total project cost can be defined as the cost of the project plus the cost of poor project quality plus the cost of lost opportunities.

The intent of the MSEM is to help provide the students the technical/science skills, professional skills, and practical experiences to deliver projects that yield desired results. These skills are useful to the technical organizations in the Central Florida and overall Florida industry.

Many industries are realizing that they need these skills of their high-tech workers and are partnering with us to deliver this education. Harris, Siemens and Lockheed-Martin are all encouraging their workers to enroll in this degree program and paying for the tuition of those who do enroll.

B. Demand: Describe data that support the assumption that students will enroll in the proposed program. Include descriptions of surveys or other communications with prospective students.

The assumption guiding the demand data is best shown in Figure 2 above. The assumption is that the trend will continue. Figure 4 provides an assumed demand profile. This demand profile is also based upon the success of the four pilot Professional Engineering Management Program (PEMP) cohorts established since 2008,

- Cohort 1 with 13 students from industrial partners of KSC, Lockheed Martin, Siemens, WDW, Boeing, CNL.
- Cohort 2 with 16 students from industrial partner Harris (company-specific)
- Cohort 3 with 13 students from industrial partner KSC (company-specific)
- Cohort 4 with 16 students from industrial partner Harris (company-specific).

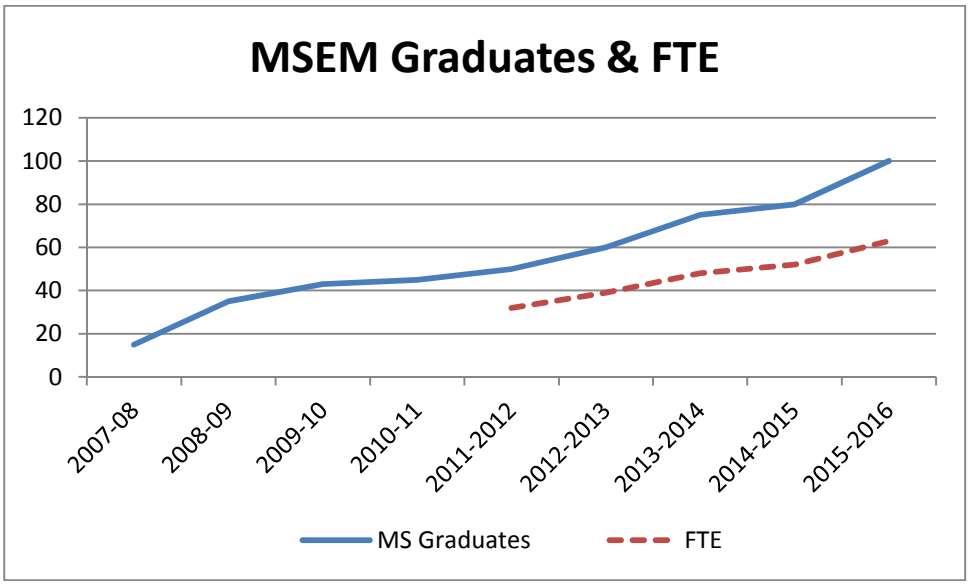


Figure 4. Assumed Demand for MSEM

The program is currently planning three additional cohorts:

- Orlando 2011 cohort with partnering organizations of Siemens, Lockheed Martin, and Walt Disney World.
- KSC 2012 cohort dedicated to KSC.
- Palm Bay/ Harris 2012 cohort with a company specific cohort dedicated to Harris Corporation.

If similar programs (either private or public) exist in the state, identify the institution(s) and geographic location(s). Summarize the outcome(s) of any communication with such programs with regard to the potential impact on their enrollment and opportunities for possible collaboration (instruction and research). Provide data that support the need for an additional program.

Figure 5 lists overlapping programs in the state of Florida.

School	Geographic Coverage	Program
Florida A&M University	Tallahassee	MSIE Management Program
Florida Atlantic University	South Florida	Graduate Minor in Engineering Management in Dept of Ocean and Mechanical Engineering
Florida Gulf Coast University	South Florida	Not applicable
Florida International University	South Florida	MS Engineering Management
Florida State University	Tallahassee	MSIE Management Program
University of Florida	Gainesville	Outreach EM—Master of Science
University of North Florida	Jacksonville, North Florida	Not applicable
University of South Florida	Tampa, Gulf Coast	MS in EM
University of West Florida	Pensacola, West Florida	Not applicable

Figure 5. Other Engineering Management Related Programs in the State University System

We do not see an impact on these other programs. As stated above, the request is being made to formalize an already existing track as a program, which now co-exists with these other programs. UCF is mostly serving industry in central Florida. Appendix VI contains the correspondence with the Chairs of these programs.

C. Use Table 1 (A for undergraduate and B for graduate) to categorize projected student headcount (HC) and Full Time Equivalents (FTE) according to primary sources. Generally undergraduate FTE will be calculated as 40 credit hours per year and graduate FTE will be calculated as 32 credit hours per year. Describe the rationale underlying enrollment projections. If, initially, students within the institution are expected to change majors to enroll in the proposed program, describe the shifts from disciplines that will likely occur.

TABLE 1-B

PROJECTED HEADCOUNT FROM POTENTIAL SOURCES

(Professional Master of Science in Engineering Management Degree Program - Combined)

SOURCE OF STUDENTS (Non-duplicated headcount in any given year)*	YEAR 1		YEAR 2		YEAR 3		YEAR 4		YEAR 5	
	HC	FTE	HC	FTE	HC	FTE	HC	FTE	HC	FTE
Individuals drawn from agencies/ industries in your service area (e.g., older returning students)	36	23.63	46	30.19	61	40.03	66	43.31	66	43.31
Students who transfer from other graduate programs within the university**	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Individuals who have recently graduated from preceding degree programs at this university	9	5.06	9	5.06	9	5.06	9	5.06	9	5.06
Individuals who graduated from preceding degree programs at other Florida public institutions	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Individuals who graduated from preceding degree programs at non-public Florida institutions	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Additional in-state residents***	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Additional out-of-state residents***	0	0.00	0	0.00	0	0.00	0	0.00	20	11.25
Additional foreign residents***	5	3.75	5	3.75	5	3.75	5	3.75	5	3.75
Other (Explain)***	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Totals	**50**	**32.44**	**60**	**39.00**	**75**	**48.84**	**80**	**52.13**	**100**	**63.38**

*List projected yearly cumulative ENROLLMENTS instead of admissions.

**If numbers appear in this category, they should go DOWN in later years

***Do not include individuals counted in any PRIOR category in a given COLUMN

The enrollment projections are based on the following assumptions:

- Year 1
  - 30 from cohort-based delivery
  - 20 from on-campus delivery
- Year 2
  - 40 from cohort-based delivery
  - 20 from on-campus delivery
- Year 3
  - 50 from cohort-based delivery
  - 25 from on-campus delivery
- Year 4
  - 50 from cohort-based delivery
  - 20 from on-campus delivery
  - 10 from online delivery
- Year 5
  - 50 from cohort-based delivery
  - 25 from on-campus delivery
  - 25 from online delivery.

The majority of the students in the program are part-time students who are working ful-time professionals. For the cohort-based programs, the students follow a fixed schedule of courses (this fixed schedule of courses is provided later). The majority of the students are Florida residents. There are a few students in the on-campus program that are international students. The growth in the first five years is primarily due to the growth in the cohort-based offerings. As the cohort-based based offering continues to gain credibility in the community, additional organizations and students will participate.

D. Indicate what steps will be taken to achieve a diverse student body in this program, and identify any minority groups that will be favorably or unfavorably impacted. <u>The university's Equal Opportunity Officer should read this section and then sign and date in the area below.</u>

Our program will provide advancement and development opportunities to a diverse population of students. The majority of the students for the program will be from Florida with a small proportion from out-of-state and international locations.
We plan to continue and expand our current recruiting efforts. We will:

- Take advantage of our Advisory Board to promote and recommend this program to their diverse staff.
- Work with the sponsoring/partnering organizations to include the cohort-based program as part of their career development programs for their diverse staff.
- Have members of the department faculty and the college staff take advantage of opportunities at invited speeches, conferences, and presentations to share information about this program.
- Encourage full-time students to apply for diversity fellowships sponsored by the College of Graduate Studies.
- Share the degree with the UCF bachelor's students to encourage them to apply.

Janet Park Balanoff — 4/6/11

Equal Opportunity Officer — Date

III. Budget

A. Use Table 2 to display projected costs and associated funding sources for Year 1 and Year 5 of program operation. Use Table 3 to show how existing Education & General funds will be shifted to support the new program in Year 1. In narrative form, summarize the contents of both tables, identifying the source of both current and new resources to be devoted to the proposed program. (Data for Year 1 and Year 5 reflect snapshots in time rather than cumulative costs.)

TABLE 2

PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1 Funding Source						Year 5 Funding Source				
	Reallocated Base * (E&G)	Enrollment Growth (E&G)	Other New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Subtotal E&G and C&G	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Subtotal E&G and C&G
Faculty Salaries and Benefits	$196,871	$0	$0	$0	$0	$196,871	$244,641	$0	$0	$0	$244,641
A&P Salaries and Benefits	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
USPS Salaries and Benefits	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Personnel Services	$0	$0	$0	$0	$107,250	$107,250	$0	$0	$0	$156,750	$156,750
Assistantships and Fellowships	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Library	$0	$5,312	$0	$0	$0	$5,312	$0	$0	$0	$0	$0
Expenses	$0	$0	$0	$0	$161,870	$161,870	$0	$0	$0	$241,686	$241,686
Operating Capital Outlay	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Special Categories	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Costs	$196,871	$5,312	$0	$0	$269,120	$471,303	$244,641	$0	$0	$398,436	$643,077

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base", "enrollment growth", and "other new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

TABLE 3

ANTICIPATED REALLOCATION OF EDUCATION AND GENERAL FUNDS

Program and/or E&G account from which current funds will be reallocated during Year 1	Base before reallocation	Amount to be reallocated	Base after reallocation
16240001 Department of Industrial Engineering	$1,985,229	$196,871	$1,788,358
Totals	$1,985,229	$196,871	$1,788,358

The revenue from the program is from the two delivery modes: traditional and cohort-based. The traditional delivery revenue is from tuition. The cohort-based revenue is from the total program fees the students pay.

The major E&G expense lies in faculty salaries and benefits. The faculty teaching in this program are currently teaching these courses as part of the on-campus track and cohorts. Thus, the reallocation is in name only, since this expense will merely be reassigned from the track to the newly-proposed program. The C&G resources are associated with the cohort expenses. These are completely covered by the tuition and supplemental fees assessed to cohort students. In the current configuration as a track, the cohorts not only fulfill an important educational need, but also operate at a moderate profit. The increased costs and associated funding in Year 5 is due primarily to a larger percentage of cohort courses scheduled to be taught during that year. As shown in the Summary Analysis (see Appendix), projected revenues are all greater than estimated costs starting in year 2 when tuition revenue derived from the previous year's enrollments is credited to the program. Even the projected deficit in Year 1 is merely a formality, since current enrollment in the track is available to offset this small deficit.

The on-campus part of the program is taught by regular faculty within the Department of Industrial Engineering who are currently teaching these courses as the track in Engineering Management. Currently, faculty costs for teaching the existing courses is $196,871 which will now be reallocated to the stand-alone program. The only new costs associated with offering this degree are modest library costs, which the department will pay.

The cohort-based program that will be offered off-campus is being paid for by the Division of Continuing Education, which pays for adjuncts, program expenses including marketing, books, materials, etc. Currently Continuing Education is paying $269, 120 for this program. The students who enroll in the off-campus programs have their tuition and fees paid by their employer (one of the companies who is partnering with us). The tuition that is paid is used to pay the tuition to the university. The additional fees are used to provide quality service to the enrolled students, paying for their books and lunches during their attendance.

Typical total costs for a student in the cohort-based program is $30,000 for the degree which covers the standard tuition and program delivery fees. The fee also covers additional items such as:

- Books
- Lunches
- Industrial scholars who provide case studies and industry perspectives
- Computers
- Use of professional, off-campus facilities.

By the fifth year, both costs and revenues will rise, reflecting larger enrollments in the program.

B. If other programs will be impacted by a reallocation of resources for the proposed program, identify the program and provide a justification for reallocating resources. Specifically address the potential negative impacts that implementation of the proposed program will have on related undergraduate programs (i.e., shift in faculty effort, reallocation of instructional resources, reduced enrollment rates, greater use of adjunct faculty and teaching assistants). Explain what steps will be taken to mitigate any such impacts. Also, discuss the potential positive impacts that the proposed program might have on related undergraduate programs (i.e., increased undergraduate research opportunities, improved quality of instruction associated with cutting-edge research, improved labs and library resources).

No other programs will be negatively impacted by this degree request. The track currently exists within the department. We are formalizing the existing MS track into an MSEM degree. The IEMS department total SCHs will increase with increasing enrollment. The department's other core courses may have an increase in SCHs.

C. Describe other potential impacts on related programs or departments (e.g., increased need for general education or common prerequisite courses, or increased need for required or elective courses outside of the proposed major).

No other programs will be impacted by this degree request. The track currently exists within the department. We are formalizing it as a degree program.

D. Describe what steps have been taken to obtain information regarding resources (financial and in-kind) available outside the institution (businesses, industrial organizations, governmental entities, etc.). Describe the external resources that appear to be available to support the proposed program.

The resources needed to support the program are minimal. The program is a professional-practice oriented degree which requires no laboratories or equipment.

IV. Projected Benefit of the Program to the University, Local Community, and State

Use information from Table 1, Table 2, and the supporting narrative for "Need and Demand" to prepare a concise statement that describes the projected benefit to the university, local community, and the state if the program is implemented. The projected benefits can be both quantitative and qualitative in nature, but there needs to be a clear distinction made between the two in the narrative.

The projected benefit to the University is three-fold.

First, the university gains by having a program that is sought by its partners to make them more productive and competitive. The university will achieve two of its goals:

- World-class graduate education
- Leading partnership university.

Second, the university will increase its SCH count. Third, the number of graduates will increase (as shown in Figure 6). The alumni pool will be bigger. These alumni are using the degree to move into the leadership positions within their organizations. The intent of the degree is to provide engineers the skills to be leaders within their technical organization. With these skills they will be able to take on more responsibility within their organizations.

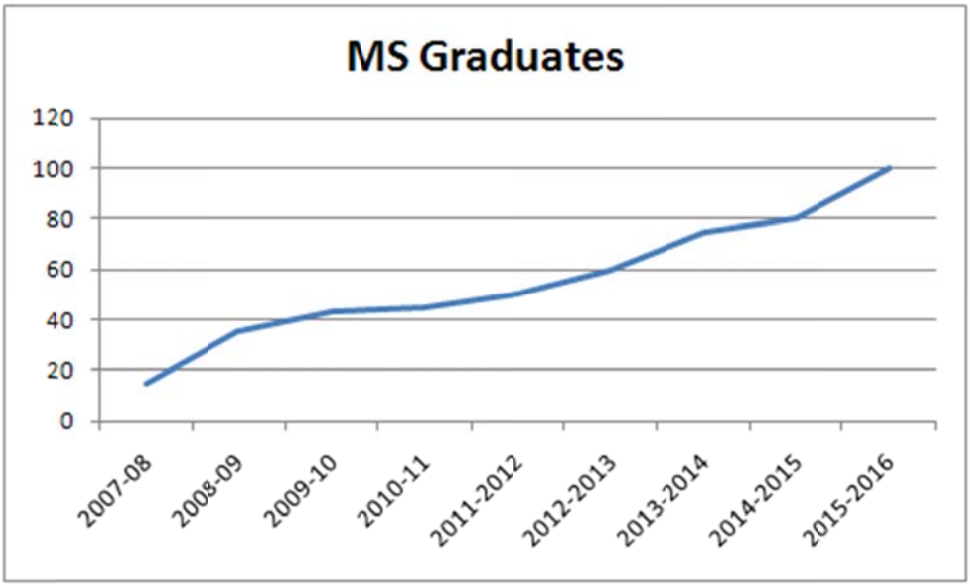


Figure 6. Assumed Demand for Master of Science in Engineering Management

The projected benefit to the local community and state is two-fold. First, the local community and state will have a knowledgeable workforce that can deliver the technological and innovative solutions. Given the economics of projects, organizations need to ensure they are choosing the right projects. Part of the criteria for picking the right projects is to ensure the selected projects are aligned with the outcomes of the business. If the wrong projects are selected, the projects may not be able to provide the needed level of revenue or profit. If the organization does not have the needed capability, the project's total cost will increase. Scott (1998) found that managers struggle with aligning projects and strategy (see Figure 7). What this research shows

us is that the selection of projects is important. Therefore, the organization must select and manage the right projects to focus on**.** The organization has many choices on the projects to pursue. The portfolio of projects must be selected to focus the organization's limited resources on the right set to deliver the desired outcomes. To select the right projects, the organization needs to ensure it has the strategic outcomes and plans defined to align the projects. The MSEM will provide these skills to the project manager.

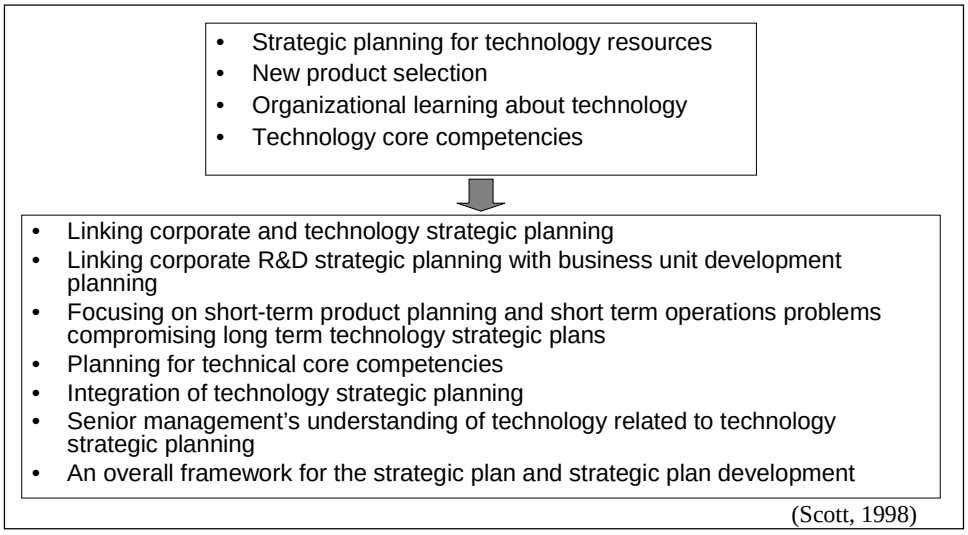


Figure 7. Challenges in Connecting Projects to Strategy.

Second, by having this knowledgeable workforce, the local organizations (both commercial and government) will better meet their missions. Their performance will increase. Testimonials from the first PEMP cohort are provided in Figure 8. Testimonials from the second PEMP cohort are provided in Figure 9.

Testimonial from the Orlando 2009 Cohort

A comprehensive, practical applications driven program with a foundation of delivering solutions and quality projects for organizations. The experience provided me with new tools, new processes and a fresh perspective to help me drive change and improve my organization, department and team. A great balance of on-line lectures, relevant course readings and class room sessions that leveraged the diverse backgrounds of the instructors and students. Great use of technologies for on-line class work, group work sessions and industry tools. Relevant for any industry: public, private, R&D, government agencies, manufacturing, construction & development ...

A well paced experience with a strong understanding of on-going work requirements and family needs. Be prepared, this is hard work ! The UCF PEMP Administrative Team made the experience seamless (enrollment, payment, books/materials, computers, graduation ...), we could not have done out without them!!—**PEMP Graduate, The Walt Disney Company**

The PEMP provides an in depth look at engineering project management in an environment that encourages discussion and exploration of best practices for the engineering professional. The program itself serves as a living example of project management with team building, resolving real-time issues, and a focus on continually evolving based on lessons learned. New and experienced project managers can benefit greatly from this program as it pushes participants to seek innovative and creative approaches to their assignments.-- **PEMP Graduate, NASA - Kennedy Space Center**

The PEMP is particularly valuable in that it provides insight into how individual leadership efforts can substantially effect the outcome of a project. This in turn helps solidify the skills and values that are most likely to contribute to both project and individual success. In other words, the PEMP maps the contributors of project success from the individual to the project and back down to the individual. This is the perfect program for anyone who wants to either manage a project or increase their value in a project centric world.-- **PEMP Graduate, NASA**

This program is very worthwhile with useful applications to hone the experienced professional to developing the new rising stars.
My top 5 individual gains included:

1- Learned enhanced skills for Facilitating group / team inputs.
2- Utilizing Innovating Thinking (cognizance of right brain).
3- The top Leadership development behaviors to emulate and practice.
4- A multitude of beneficial Systematic Project Management approaches / tools.
5- Stretching beyond normal responsibilities, into Strategic / Program thinking.

My top 5 potential benefits to other candidates from KSC (or other companies):

1- Builds confidence in leading projects / programs.
2- Provides a multitude of useful tools for all project managers.
3- Offers external lessons learned / data (outside KSC or your company).
4- Develops Team leadership skills.
5- Enables one to think big picture / strategically.

PEMP Graduate, NASA Technical Integration Manager (Design)

Anyone contemplating career advancement or a change in discipline direction geared towards project management will benefit from the in-depth knowledge and expertise of the Program academia and subject matter experts. The principles of project management and leadership combined with real world experiences provide a basis to move your career upward and outward. PEMP is not your run-of-the-mill graduate program. It is a program designed to communicate the knowledge of academia and subject matter experts in the areas of project management and leadership to working engineers. The program was presented in a small group forum, accentuated by close student/teacher relationships and the diverse working backgrounds of the student collective.

The knowledge, leadership, and understanding of the PEMP academia has been outstanding. The importance of each facet of project management was deftly communicated through instruction, example, as well as individual and group project research and submission. --**PEMP Graduate, Boeing**

The concepts, tools, relationships, and experiences acquired and created during the UCF PEMP are invaluable both professionally and personally. The PEMP provided me with a solid and deep foundation for both establishing and managing a technical organization and upon which I can build both my organization and career. By far the best educational experience of my life!
PEMP Graduate, NASA

The PEMP provided me with a greater understanding, tools, and processes to produce a product; starting with the significance of linking that product back to the company's strategy and portfolio. --**PEMP Graduate, NASA**

Figure 8. Testimonials from the First PEMP Cohort

Testimonials from the Harris 2009 Cohort
Applying the learnings that I received during the first three courses alone directly resulted in a ~$2.5M contract for prototype software, and a ROM was just submitted for a ~$8M follow-on effort to formalize the prototype software. The profit generated from these activities will likely cover the cost of the degree program for my entire cohort, and, potentially, for future cohorts to come. That being said, ROI on this venture from this point forward can basically be considered infinite.
Combining Harris process with real world practices, these courses drive home how and why to pursue new business. Offering key insights on how to deliver solutions, not just solve problems. Thanks
I was able to immediately apply the concepts taught in the classes in my current job. the instructors were excellent. Meeting locally on off Fridays was very convenient, and the 15 month duration was great. An excellent program teaching critical tools for leadership, strategy and decision making.
I'd like to thank you for the extraordinary education I was given in the UCF MSEM program. I am impressed by the level of effort made from the professors, and the staff, to allow me to focus on the learning and the real world application. This program was both challenging and rewarding, and I highly recommend it to anyone interested in a higher level learning program which truly applies to the workplace. Thank you.
The value of this program actually goes beyond the APE role. As Chief Systems Engineer and Subcontract Technical Representative, I actively use the learnings that I received during this degree program to help lead the technical teams that I oversee, build stronger relationships with my customer, and generate new business.
The Harris - UCF PEMP program for APE's was excellent. For the majority of the program, the coursework ran parallel to the EBO project I was working on. I'd learn something in class and immediately apply it to our project at work and I feel it helped us develop a much better product for our internal and external customers.
Wanted to give you a personal update. The best way to begin is by quoting our Engineering VP Craig Miller about a recent career change…"so, you skipped going to the dark side and went straight to selling your soul". (with a devious laugh) I had been working formally as an APE for almost a year when I was recently "asked" to take a new role. I am now not only a program manager but a "branch lead", which has several program managers reporting to me. It is somewhat like being a major portfolio manager. This is a little awkward for me as I have never been a PM before. Fortunately I know the technology and customers very well. I probably would not have taken this role had it not been for your curriculum. I have never been shy jumping into new challenges (and have always tried to be a leader by example) but the project management aspect of your program really gave me the confidence to take this on. I can't say enough how valuable the program was for me given this new role. Thanks again!
This open letter of recommendation and thanks for the UCF Master program is long overdue. I want to comment in a way that will be helpful to any future students or organizations that may consider this program and course study. This is based on my learning as a participant in the first class of the Harris UCF cohort and the subsequent work that I have done. When we first met and in the first discussions with Dr. Kotnour we were presented with a scope of where this program fell in the broad offerings of Masters Programs. It was not a pure Systems Engineering course and it was not a business MBA. It was to teach us to be "Solution Providers". That is a fairly bold statement, so how did the course measure up now that I have had some time to reflect on the studies? Let's set the grading of the course by the same terms in which we were graded. Our final course presented us with the question: " How does a relevant, responsive, and ready project-based organization (and project manager) deliver strategic solutions transform a customer's organization? " Let's test the relevancy of the course work to the real world. I have heard many former students of many other various Masters Programs remark that a year or up to 5 years after finishing their Masters they have for the first time made use of some knowledge they gain in their studies. By contrast, I use something from the Harris UCF cohort, every single week, since finishing the course. This does not imply that I make equal use of everyone of the ten course subjects, but I can state with complete honesty that I use some knowledge or technique that I learned during the program every single week and usually every single day. That rates an A for relevance. How responsive is the course? This is a difficult subject because of the very nature of a Master Program. It has to have some structure and a means to meeting a goal. Remember the goal was to facilitate knowledge for each of the students so we could become "Solution Providers". That being said, the course with Dr. Kotnour's guidance was always in a mode of self-examination, much like the feedback loop in any good Systems Engineering model. We saw improvements as we moved through the courses and we provided our input that are already making subsequent courses better. The next factor is the readiness of the program. The Harris UCF cohort was targeting the role of the APE (Advanced Program Engineer). This subset of Systems Engineering is not universally recognized by all engineering organizations and therefore much of the material had to be specially catered to this unique set of requirements. The courses were selected to emphasize the qualities that enable the students to succeed as an APE. To be sure, refinement is still required, but the program is on target with course work that truly achieves the goal to create unique individuals that are "Solution Providers."

Figure 9. Testimonials from the Second PEMP Cohort

Appendix III contains a set of support letters from the following industrial partners:

- Siemens Power Generation
- Walt Disney
- Kennedy Space Center.

V. Access and Articulation – Bachelor's Degrees Only

A. If the total number of credit hours to earn a degree exceeds 120, provide a justification for an exception to the policy of a 120 maximum and submit a request to the BOG for an exception along with notification of the program's approval. (See criteria in BOG Regulation 6C-8.014)

Not applicable.

B. List program prerequisites and provide assurance that they are the same as the approved common prerequisites for other such degree programs within the SUS (see the Common Prerequisite Manual at FACTS.org). The courses in the Common Prerequisite Counseling Manual are intended to be those that are required of both native and transfer students prior to entrance to the major program, not simply lower-level courses that are required prior to graduation. The common prerequisites and substitute courses are mandatory for all institution programs listed, and must be approved by the Articulation Coordinating Committee (ACC). This requirement includes those programs designated as "limited access."

If the proposed prerequisites are not listed in the Manual, provide a rationale for a request for exception to the policy of common prerequisites. NOTE: Typically, all lower-division courses required for admission into the major will be considered prerequisites. The curriculum can require lower-division courses that are not prerequisites for admission into the major, as long as those courses are built into the curriculum for the upper-level 60 credit hours. If there are already common prerequisites for other degree programs with the same proposed CIP, every effort must be made to utilize the previously approved prerequisites instead of recommending an additional "track" of prerequisites for that CIP. Additional tracks may not be approved by the ACC, thereby holding up the full approval of the degree program. Programs will not be entered into the State University System Inventory until any exceptions to the approved common prerequisites are approved by the ACC.

Not applicable.

C. If the university intends to seek formal Limited Access status for the proposed program, provide a rationale that includes an analysis of diversity issues with respect to such a designation. Explain how the university will ensure that community college transfer students are not disadvantaged by the Limited Access status. NOTE: The policy and criteria for Limited Access are identified in BOG Regulation 6C-8.013. Submit the Limited Access Program Request form along with this document.

Not applicable.

D. If the proposed program is an AS-to-BS capstone, ensure that it adheres to the guidelines approved by the Articulation Coordinating Committee for such programs, as set forth in Rule 6A-10.024 (see Statewide Articulation Manual at FACTS.org). List the prerequisites, if any, including the specific AS degrees which may transfer into the program.

Not applicable.

INSTITUTIONAL READINESS

VI. Related Institutional Mission and Strength

A. Describe how the goals of the proposed program relate to the institutional mission statement as contained in the SUS Strategic Plan and the University Strategic Plan.

The goals of the program are to:

- Enable engineers to transition to leadership positions
- Develop knowledge useful to the managing and leading of technical projects and organizations.

These goals are consistent with the UCF's Mission and University Strategic Plan.

1) The program is consistent with the UCF mission.

The UCF mission is to offer high-quality undergraduate and graduate education, student development, and continuing education; to conduct research and creative activities; and to provide services that enhance the intellectual, cultural, environmental, and economic development of the metropolitan region, address national and international issues in key areas, establish UCF as a major presence, and contribute to the global community.

The MSEM contributes to UCF's mission by providing a high-quality graduate education. The program provides a service to the intellectual development of the community's ability to deliver innovative solutions. The program offers a set of courses to develop the skills and experiences in three areas:

1) Technical courses
2) Professional courses
3) Experiential experiences.

2) The program is consistent with the UCF's Goals.

The UCF Goals are

- Goal 1: Offer the best undergraduate education available in Florida.
- Goal 2: Achieve international prominence in key programs of graduate study and research.
- Goal 3: Provide international focus to our curricula and research programs.
- Goal 4: Become more inclusive and diverse.
- Goal 5: Be America's leading partnership university.

The MS in Engineering Management-PSM degree contributes to Goals 2 and 5. The curriculum provides a unique graduate program. The MS in Engineering Management-PSM and the Professional Engineering Management cohort-based offering program option is being offered in partnership with the leading technical organizations in central Florida (e.g., Siemens, KSC, Harris, Lockheed Martin, Walt Disney World).

The MSEM provides a program the technical, engineering community needs for sustained growth of their organizations. Organizations that are already participating in the cohort program include:

- Harris
- Siemens Power Generation
- Walt Disney World
- Boeing
- NASA/Kennedy Space Center
- Lockheed Martin.

These organizations reviewed and refined the initial curriculum. They also provided support to the students to be part of the degree. They reviewed the degree's assessment data and validated our performance improvement plan. They continue to provide an industry perspective to the curriculum.

Additional organizations to pursue participation include:

- LM Simulation and IS
- Progress Energy
- OUC
- Northrop Grumman
- FISERV
- STRICOM
- NOCTSD
- Air Force
- National Reconnaissance Organization.

B. Describe how the proposed program specifically relates to existing institutional strengths, such as programs of emphasis, other academic programs, and/or institutes and centers.

The program is consistent with institutional strengths.

First, the MSEM is formalizing and leveraging the already existing strength of the existing MS Engineering Management track being offered within the MS degree in Industrial Engineering. By offering the MSEM we will be making this contribution more explicit and known to the community. As discussed earlier, the existing MS track is strong and this request will enhance the performance by offering an explicitly named degree.

Second, the MSEM is supportive of the College of Engineering & Computer Science's Engineering Leadership & Innovation Institute (eli^2). eli^2's strategic direction is provided in Figure 10.

Mission
Creating leaders who lead with values and passion to deliver innovative solutions to the toughest challenges

Goals

Goal 1: Create Professional Contributors (UG)
- Transform Students to Leaders of Themselves

Goal 2: Create Program/Project Leaders
- Transform Engineering Professionals to Team Leaders

Goal 3: Enable Organizational Leaders (Executive)
- Transform Engineering Professionals to Organizational Leaders

Goal 4: Produce and Share Engineering Leadership & Innovation Knowledge
- Transform Understanding to Enhanced Practice

Goal 5: Build an Engineering Leadership Community
- Leaders Actively Participating in the Institute.

Figure 10. Engineering Leadership & Innovation Institute's Strategic Direction.

As shown in Figure 11, the institute focuses on the life-long engagement of the engineer. The MSEM degree is a vital part of this life-long engagement. The MSEM provides the advanced study professional, graduate students require.

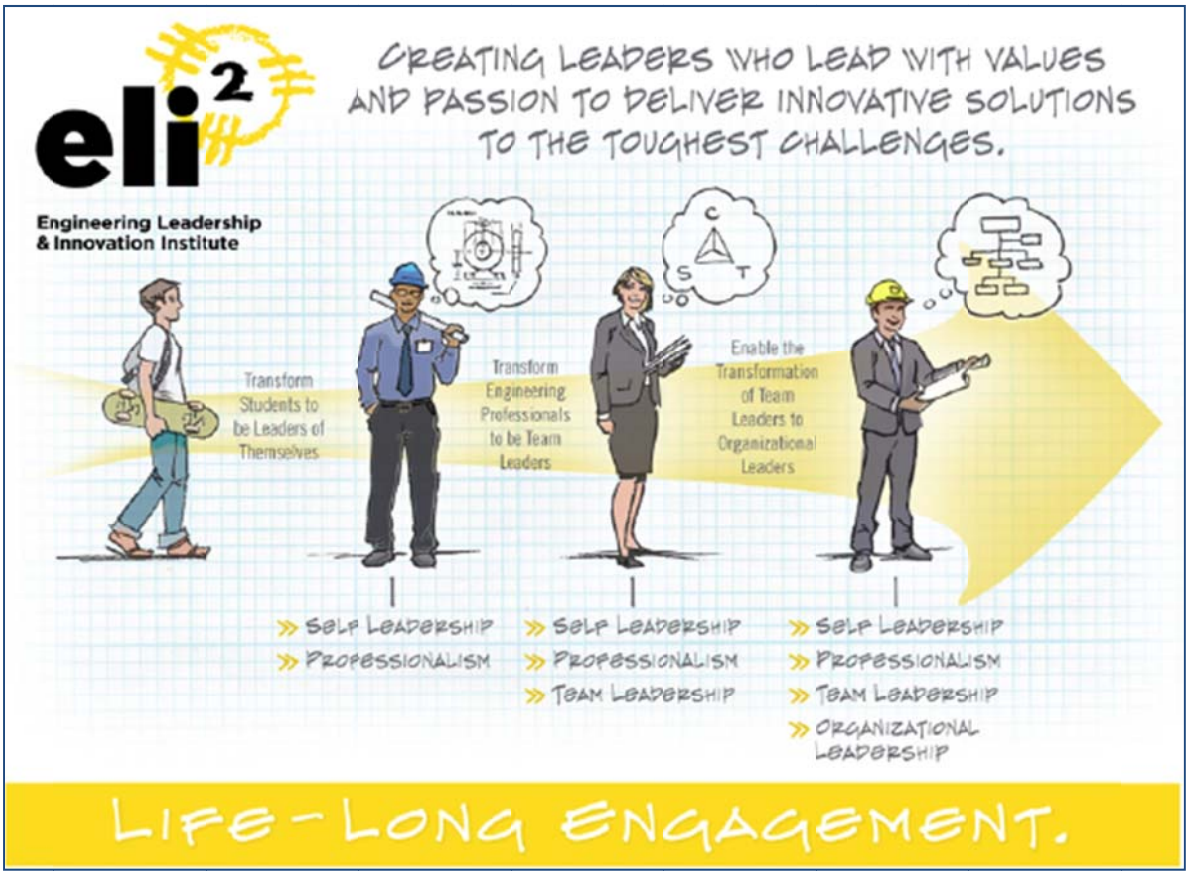


Figure 11. Life-Long Learning of the Engineering Student

C. Provide a narrative of the planning process leading up to submission of this proposal. Include a chronology (table) of activities, listing both university personnel directly involved and external individuals who participated in planning. Provide a timetable of events necessary for the implementation of the proposed program.

The process for this request began in 2007. The Dean of the College of Engineering and Computer Science requested the department to review current offerings with an emphasis on how to improve them. A planning committee was established. This committee developed the enhanced PEMP. The committee shared the concept with industry leaders (e.g., Lockheed Martin, Siemens, WDW, KSC, Harris Corporation). The leaders provided input and feedback. Based on this feedback the PEMP Orlando 2009 cohort was offered. In working with the students of this cohort and subsequent ones (i.e., Harris and KSC cohorts), the students pointed out a desire for a degree title that more specifically reflected the engineering management training—they wanted more than a "Master of Science" on their transcripts, but rather a "Master of Science in Engineering Management." This degree title helps marketability of their new skill set. Furthermore, during the summer of 2010, the faculty associated with the PEMP conducted a formal assessment of the program. This assessment pointed to the need to pursue the MSEM degree. Figure 12 summarizes the major planning activities.

Date	Participants	Planning Activity
Summer 2007	Dean Gallagher	Request to understand the graduate programs and how to improve them.
Fall 2007	Dr. Kotnour	Reflect on current program's strengths, weaknesses, opportunities, and threats
Spring 2008	Drs. Kotnour, Reilly, Karwowski, Hoesktra	Series of planning meetings to brainstorm and develop a conceptual approach for the professional Engineering Management offering. Products from this work included: • High-level educational objectives • Program content options • Benchmarking data.
Summer 2008	Drs. Kotnour, Reilly, Karwowski, Hoesktra, Mollaghasemi	Series of planning meetings to develop and design detailed offering of the EM. Products from this work included: • Detailed educational objectives • Detailed course objectives • Different delivery options
Fall 2009	Drs. Kotnour, Reilly, Karwowski,	Share with industry and adjust with feedback via IEMS advisory board, Dean's advisory board, and direct meetings with industry. The industry partners the concept was shared with included: • WDW, Siemens Power Generation, KSC, Boeing, Lockheed Martin, CNL
Fall 2009	Dean Simann	Submitted a whitepaper to offer the Engineering Management track as a stand-alone degree program
Late Fall 2009	Provost Hickey	Accepted whitepaper as a Professional Science Master's program in recognition of the program goals and placed on 3 year master development plan for new programs.
Spring 2009-spring 2010	Participants included: • CECS • IEMS faculty • Regional Campuses & Continuing Education • Office of Research & Commercialization. • KSC, Boeing, Siemens Power Generation, CNL	Offer Orlando 2009 cohort. Develop and implement plans to offer cohort. Series of planning sessions within UCF to implement the program.
Summer 2009-summer 2010	Participants included: • CECS • IEMS faculty • College of Business • Regional Campuses & Continuing Education • Harris	Offer Harris 2009 cohort. Develop and implement plans to offer cohort.
Summer 2010	Core teaching faculty of Drs. Kotnour, Hoekstra, Nazzal, and Mollaghasemi.	Conduct program assessment. Analyze assessment data and identify detailed improvement needs and strategies.
Fall 2010	Drs. Kotnour, Reilly, Elshennawy, Bishop	Based on the student feedback to develop a more recognized degree (i.e., MS), the group of faculty held a series of meeting to define the MS formal degree request and develop the proposal for the MS in Engineering Management—PSM.
Spring 2011	Drs. Kotnour, Reilly, Elshennawy, Bishop	Formalize the request and process through the Department, College, and University Graduate Committees for approval.
Spring 2011	Industrial Engineering Department	Approval obtained on April 7, 2011 for the proposal
Spring 2011	College of Engineering and Computer Science	Approval obtained on April 13, 2011 for the proposal
Spring 2011	Graduate Council	Approval obtained on April 15, 2011 for the proposal
Summer 2011	Board of Trustees	Approval obtained at July meeting

Figure 12. Summary of Major Planning Efforts

The events leading to implementation are already in progress, given that it already functions as a semi-independent track. The major activities associated with the conversion to a full-fledged degree program are administrative and marketing in nature and highlighted in Figure 13.

Date	Implementation Activity
Summer 2011	• Update graduate admissions catalogue and information • Update marketing information (website and brochure) • Update graduate catalogue • Update program website • Market the program • Begin to accept applicants for the Fall 2011 Orlando cohort • Begin to accept applicants for the Fall 2011 on campus program
Fall 2011	• Execute the Fall 2011 Orlando cohort • Execute Fall 2011 on campus program • Market and accept applicants for the Spring 2012 KSC cohort
Spring 2012	• Execute the Fall 2011 Orlando cohort • Execute Fall 2011 on campus program • Execute the Spring 2012 KSC cohort • Market and accept applicants for the Summer 2012 Palm Bay cohort
Summer 2012	• Execute the Fall 2011 Orlando cohort • Execute Fall 2011 on campus program • Execute the Spring 2012 KSC cohort • Execute the Summer 2012 Palm Bay cohort
Fall 2012	• Execute the Fall 2011 Orlando cohort • Execute Fall 2011 on campus program • Execute the Spring 2012 KSC cohort • Execute the Summer 2012 Palm Bay cohort
Spring	• Graduate Orlando Fall 2011 Orlando Cohort • Execute Fall 2011 on campus program • Execute the Spring 2012 KSC cohort • Execute the Summer 2012 Palm Bay cohort

Figure 13. Near-Term Events to Transition to a Separate Degree

VII. Program Quality Indicators - Reviews and Accreditation

Identify program reviews, accreditation visits, or internal reviews for any university degree programs related to the proposed program, especially any within the same academic unit. List all recommendations and summarize the institution's progress in implementing the recommendations.

The programs reviews are twofold:

1. External reviews of the IEMS Department
2. Review and assessment of the cohort-based PEMP.

External reviews of the IEMS Department

The IEMS Department had a program review conducted in 2004-2005. This review was conducted by Dr. Jane Ammons (Associate Dean of Engineering for Faculty Affairs and Professor of Industrial and Systems Engineering at the Georgia Institute of Technology). Her feedback and the response by the department is provided in Figure 14.

Recommendations from Dr. Jane Ammons for the 2004-2004 Program Review	Status of Improvement Actions
No critical weaknesses in the M.S.I.E. or M.S. curriculum were observed. One potential concern should be raised. Some of the tracks report a relatively low number of students enrolled (e.g., in 2003-4 there were 5 students in the M.S. with Operations Research track, 6 students in the Quality Engineering track, and 5 students in the Simulation Modeling and Analysis track). Given the size of the faculty and the limited resources, can the department "afford" this much specialization for so few students? It could be that cross-listings prevent these specializations from causing extra "penalities" to resources and that this is really not a concern.	The department has adjusted offerings. A new streamlined structure was presented to the Graduate Council in Spring 2011. Enrollment is expected to increase with the new MSEM degree.
Student/faculty ratios are a concern for the graduate program. Rather than focus solely on the growth of the program, the graduate student recruiting process can be made more proactive in seeking top quality students. Also, the monetary award level for fellowships and stipends can be raised to be more competitive to attract the highest caliber students. The number of the awards could be increased in order to attract more of the highest caliber students.	For MS students they are primarily funded from their sponsoring organizations. The additional revenue from the MSEM cohort-based program can be used to support PhD students.
As the comments above indicate, the formal recruitment plan can be enhanced to make it more proactive and more attractive to the highest quality students. Graduate students are selected for research assistants by "shopping" their application materials among the faculty who might have support. This can result in delays in getting back to the best students with support confirmations, and during the delay, the best students may decide to go elsewhere.	Consistent with the streamlined programs we are focusing our recruitment efforts. The EM track is working with industry to identify the high performers with the organizations to participate in the program. IEMS has established a graduate admissions committee to review PhD applications—this will help professors see potential students to fund.
The department is carrying several tracks that do not have very many students enrolled. Given the pressure for competing resources, if this differentation is causing any "penalties," then perhaps the differentiation efforts could be better served at the doctoral level.	The department has adjusted offerings. A new streamlined structure was presented to the Graduate Council in Spring 2011.

Figure 14. Response to 2004-2005 Program Review by Dr. Ammons

Based on this review, Dean Neal Gallagher provided feedback to the department. This feedback and department's steps are provided in Figure 15.

Recommendations from Dean Gallagher for the 2004-2004 Program Review	Status of Improvement Actions
• 1. Improve the quality of the students. Invest in aggressive marketing and recruitment plans to increase high quality student applicant pool. As per the Consultant, Dr. Ammons, "The program has a reputation for size, as one of the larger graduate programs in the country…In comparison to similar programs at comprehensive state research universities, this program is at least in the top 30%. A key way to build the reputation of the MSIE and MS programs is [to] enhance the incoming quality of the students through proactive recruiting of the highest quality applicants."	Consistent with the streamlined programs we are focusing our recruitment efforts. The EM track is working with industry to identify the high performers with the organizations to participate in the program. The admission process and standards are the same for the IEMS MS programs.
• 2. Offer online degree programs to meet the needs of industry partners and professionals, especially by expanding the department's strong Systems Engineering and Management program aimed at professionals, currently restricted to NASA employees and KSC contractors. The modeling and simulation program has the opportunity of developing into a unique, world-class program. Other popular areas include: Project engineering, entrepreneurship, and leadership. As per the Consultant, Dr. Ammons, "The M.S.I.E. and M.S. programs provide a very good masters level education in industrial engineering with multiple tracks to allow the students to specialize in field areas. Noteworthy are the concentrations in modeling and simulation, ergonomics and human factors, and engineering management…. The engineering track of the MS program is heavily populated and seems to be meeting a regional need. The department is carrying several tracks that do not have very many students enrolled. Given the pressure for competing resources, if this differentiation is causing any 'penalties,' then perhaps the differentiation efforts could be better served at the doctoral level."	We are working on developing an online offering in Engineering Management. We piloted an approach with Emery Riddle. We are learning from this experience. The department has adjusted offerings. A new streamlined structure was presented to the Graduate Council in Spring 2011.
• 3. Introduce new concentrations into the curriculum in innovative areas such as health systems and nano-manufacturing systems. Provide opportunities for other interdisciplinary curricular development. As per the Consultant, Dr. Ammons, "Potential opportunities for curricular development with other disciplines, or interdisciplinary curriculum, that could be pursued include specific courses focused on health systems and on nano-manufacturing systems."	The IEMS Department has started a research project on health-care systems with the VA. This will provide insight into the education needs.
• 4. Optimize efforts to have faculty work in research "teams" and go after larger grants or contracts from industry, rather than single investigator grants, which are time-intensive. Strengthen interdisciplinary research collaborations especially in innovative areas such as nano-manufacturing. Strengthen interdisciplinary collaborations with other departments such as Mechanical engineering, Computer Science, and Information Systems Technology.	The Department has developed a team approach to pursue research with the Veteran's Administration. This effort resulted in a funded project.
• 5. Aggressively pursue more (foundation) fund-raising activities and jumbo ($) grant activities to secure funds for student scholarships and fellowships and increase research expenditures per faculty. Assistantship stipends are not competitive with top research-intensive universities. As per the Consultant, Dr. Ammons, "…Also, the monetary award level for fellowships and stipends can be raised to be more competitive to attract the highest caliber students. The number of the awards could be decreased in order to attract more of the highest caliber students."	The chair is working with the IEMS Industrial Advisory Board on this effort.

Figure 15. Response to 2004-2005 Program Review by Dean Neal Gallagher

The response to the formal report from the 2004-2005 program review is provided in Figure 16.

Recommendations from Consultants, Dean and Program Review Committee (2004-2005 Program Review)	Response
Department of Industrial Engineering and Management Science • Encourage faculty members to submit more papers to peer-reviewed journals. • Engage more faculty members in department and professional activities, including more out of class time with students. • Consider the development and implementation of innovative curricular concentrations in areas such as health systems and nano-manufacturing systems. • Invest in lab space and related personnel. Hire a "lab instrument maker" to maintain sophisticated equipment and state-of the-art labs; and hire a machine shop professor. • Consider the development of an integrated B.S. to M.S. degree program to recruit students from related disciplines.	• Since 2007 faulty we have significantly increased our efforts to publish papers in peer review journals. • The faculty is very engaged in variety of student chapters, including IIE, ASQ, SME and after-class activities.. We have also established a new student chapter of INCOSE. • Our UG students have been receiving awards and recognitions at the regional and national levels. • We have restructured our MS and PhD curricula to better fir the modern IE needs, supported by active research in health care and systems engineering. We concentrate on service area, rather than manufacturing. • We have benefited from the lab and equipment fees that been used to update our equipment. • MMAE Department is now in charge of manufacturing facility and CECS is supporting machining operations. • We have implemented accelerated BS to MS program for our best students. Our UG student population have increased from 165 in 2007 to over 270 in Fall 2010 and is still growing. IEMS UG Recruitment Committee has been established and is very active. We hired new UG program Advisor in 2008 who is doing an excellent job in UG student advising.
Industrial Engineering, B.S. • Develop and implement undergraduate minor programs in concentrations that better prepare undergraduates for graduate work, such as engineering management, project engineering, entrepreneurship, leadership, and sales engineering. • Encourage faculty research activity.	• We have redesigned the content of our UG curriculum to better prepare UG students for graduate work. IEMS faculty has worked on NSF funded large scale project on UG curriculum redesign to fit the needs of the future. We have also implemented a new leadership minor. • We have designated faculty who are interested in research and those who are interested in teaching, and re-aligned teaching assignments with release time for research provided to "research" faculty with active grants. Despite the loss of 8 faculty members (including two of our best research performers) since July 1, 2007 (and addition of only 2 non-tenured faculty lines) our research productivity (funded research grants and journal publications) in 2010 is at the same level as it was in 2006.
Industrial Engineering, M.S. • Aggressively and proactively recruit high-quality students by offering competitive stipends for fellowships, scholarships, and research assistantships. • Consider offering online degree programs to meet the needs of industry partners and professionals, especially by expanding the department's strong Systems Engineering and Management program (aimed at professionals, currently restricted to NASA employees and KSC contractors). • Provide opportunities for other interdisciplinary curricular development.	• We have the largest M/S / MSIE level program in the CECS and attract many non-traditional students form industry. • We now offer 90% of our courses on-line, and plan to offer online degree programs in the near future. We have added Systems Engineering track to our MS program. We have also developed and implemented MS Professional Engineering Management Program, which will transition to on-line in the next two years. • Our MS program is very interdisciplinary in nature, with 7 different tracks. Our faculty have been proactive in adding the leadership and sustainability issues into our curricula. We are also leading the teaching efforts in the Interdisciplinary Modeling and Simulation Program. We are also very active in the UCF/ERAU PSM in Modeling and Simulation.
Industrial Engineering, Ph.D. • Aggressively and proactively recruit high-quality students by offering competitive stipends for fellowships, scholarships, and research assistantships. • Require Ph.D. students to submit their research for publication in the highest quality peer-reviewed archival journals.	• We provide our best PhD students with tuition waivers and research assistantships (limited by Graduate School and availability of research funding). • IEMS faculty have recently discussed this suggestion and will take an action on it in the Fall 2011. However, all research faculty who advise PhD students have been successful in publishing the results of their work in peer review journals. In addition, all PhD students are now required to take Research Methods class, and are introduced to research methods early on in their PhD study cycle.

Figure 16. Response to 2004-2005 Program Review

Review and assessment of the cohort-based EM program.

As part of the on-going administration of the program, the core faculty conducted a formal program assessment. This assessment uses the standard course evaluation data augmented with program specific assessment and focus groups with program participants. Formal documents of this review process are available for review. Figure 17 summarizes the recommendations and the status of the actions being taken to address the improvement areas.

Focus Area	Feedback	Status of Improvement Actions
Ensure We Maintain High-Quality Delivery	1) We need to ensure we deliver the high-level, quality program always.	Ongoing, this is something we emphasize with each class. We have developed a "playbook" to help us ensure this happens.
Improve the Current Offering	1) Improve the feedback to the students	Standard tools have been defined for each course and are being implemented in the KSC and Harris 2 cohorts.
	2) Ensure expectations are consistent	Standard tools have been defined for each course and are being implemented in the KSC and Harris 2 cohorts.
	3) Improve the program-wide project expectations and feedback	Standard tools have been defined for each course and are being implemented in the KSC and Harris 2 cohorts.
	4) Provide overall product view to the program—the products expected to produce in each course	Standard tools have been defined for each course and are being implemented in the KSC and Harris 2 cohorts.
	5) Enhance the overall technology/webcourses structure	The overall structure is being reviewed. Options are being shared with the students to help us pick the easiest to use from their perspective.
	6) Improve access to the videos	This is part of the effort for #5 above.
	7) Combine Systems Engineering & Human Systems Integration	This is completed and was pilot tested in the Fall 2010 KSC cohort.
	8) Add a "Technical Communication" course	This was added.
	9) Ensure students understand the expectations and challenges of the program	This was added to the information sessions and orientation sessions for the KSC and Harris 2 cohorts.
	10) Balance schedule—provide a break and have contingency for when students need a break	We work this for each cohort specifically.
	11) Enhance program evaluation methods and participation	Standard tools have been defined for each course and are being implemented in the KSC and Harris 2 cohorts.
Set the Standard for Best in Class	12) Improve the professional quality of the materials	We will take further action on these as we stabilize the program changes from above
	13) Work the technology support (education, collaboration, life-cycle/project management)	We will take further action on these as we stabilize the program changes from above
Build the Community	14) Hold an organization specific internal learning community for each company specific cohort	We have run a session with the Harris I cohort. They are now running internally on their own. We will support as requested.
	15) Social media across cohorts	We are in the planning stages.
	16) "Reunion with content"	We are in the planning stages.
Integration with Engineering Leadership Institute		The core faculty members involved in the cohort offering are involved in the leadership institute.

Figure 17. Improvement Areas and Status of Implementation (From the cohort-based offerings—the learning are applicable to the traditional offering as well)

VIII. Curriculum

A. Describe the specific expected student learning outcomes associated with the proposed program. If a bachelor's degree program, include a web link to the Academic Learning Compact or include the document itself as an appendix.

The specific outcome of the student's performance is to:

- Increase a student's capability to deliver innovative solutions in a corporate environment.

This outcome will be delivered through the following mechanisms:

- Traditional on-campus program
- Cohort-based program conducted at Regional Campuses.

The specific outcome is further allocated to more specific performance objectives. These performance objectives allocated into educational objectives which are then allocated to specific courses. Figure 18 defines these objectives.

Performance Objective	Educational Objectives
Increase the student's ability to start a project with the business need at the forefront of the planning process	• Defining the core challenges of a project-based organization • Understanding how to formulate to connect a project to the organization's strategic and portfolio plans • Defining a business model of the organizational system • Using a systematic decision making & critical thinking process
Increase the student's ability to use data and statistics to make sound, informed business decisions.	• Collecting and summarizing data • Understanding the concept of variation—special and common cause of variation • Understanding the overall statistical analysis process • Understanding the process to select the appropriate analysis approach—understand "when to" and "when not to" use an analysis technique • Understanding the role of business analytics in corporate performance • Defining the business analytics process • Understanding the typical statistical analysis tools associated with Lean/Six Sigma
Increase the student's ability to design a user-centered product/service system by developing creative ideas and prototypes.	• Understanding the product design process • Understanding the different tools available to understand customer requirements • Understanding the creative brainstorming process • Understanding the prototype development process
Increase the student's ability to make rational decisions while evaluating trade space options (i.e., make decisions within the trade study process)	• Using analytical tools to make decisions • Understanding the role of analytical tools to make business decisions within a decision making process • Understanding the overall decision analysis process • Understanding the process to select the appropriate analysis approach—understand "when to" and "when not to" use an analysis technique • Providing an overview of simulation and modeling as a tool for making decisions
Increase the student's ability to define a product to meet requirements.	• Defining the systems engineering process • Understanding and applying the systems engineering process • Understanding how to define requirements • Understanding how to allocate, manage, and verify requirements • Understanding configuration control • Understanding the role of the "ilities" • Understanding the technical risk management process and tools
Increase the student's ability to communicate effectively in an organizational setting	• Understanding approaches for developing and giving presentations • Understanding approaches for writing technical reports • Understanding approaches for holding meaningful conversation (speaking with and listening to)
Increase the student's ability to deliver a project and have a successful project (meet commitments and expectations for a project).	• Understanding the multiple roles of a project manager as a solution provider and how these roles change over the life-cycle of a project • Understanding how to formulate a project to gain approval • Understanding the project management process and tools • Understanding the "project review" process and tools
Increase the student's ability to deliver a project within cost expectations and to make decisions within the corporate financial perspective	• Understanding the technical underpinning of engineering economic and simulation based costing analysis. • Understanding how to read financial statements • Understanding how project decisions impact the organization's profit equations and overall financial health • Understand the role of life cycle costing for complex systems
Increase the student's ability to navigate the core processes of and overcome the typical challenges of a project-based organization.	• Understanding the environment of the technical organization • Understanding the basics of organizational behavior as they apply to scientists and engineers • Understanding how to organize and staff the project and office team • Understanding the leadership skills of the project manager, how to manage individuals, your time, project teams. • Understanding how to deal with conflict.
Increase the student's ability to strategically manage an engineering organization	• Understanding the nature of organizational transformation • Identifying the core processes of a project-based organization • Evaluating the core challenges of a project-based organization • Understanding the strategic management process of the organization • Understanding the portfolio management process of the organization • Understanding how to "connect the dots"

Figure 18. Educational Objectives

B. Describe the admission standards and graduation requirements for the program.

The admission standards for the degree are:

- Undergraduate degree GPA of 3.0 or greater
- Proficiency with MS Office expected
- Mathematics through Calculus II (MAC 2312)
- STA 3032 or equivalent
- GRE is not required.

The graduation requirements follow the standard requirements for all graduate students at the university.

C. Describe the curricular framework for the proposed program, including number of credit hours and composition of required core courses, restricted electives, unrestricted electives, thesis requirements, and dissertation requirements. Identify the total numbers of semester credit hours for the degree.

The Engineering Management degree curriculum is designed to educate and train students for high-level engineering project management in professional settings. As such, it is a perfect match for the structure of a Professional Science Master's (PSM) degree (see Fig. 19, taken from http://www.sciencemasters.com/). Consistent with the PSM structure, the Engineering Management degree curriculum will contain:

- Professional content
- Advanced scientific content
- Experiential learning experiences in professional settings and contexts
- A PSM Advisory Board

> The Professional Science Master's (PSM) is an innovative, new graduate degree designed to allow students to pursue advanced training in science or mathematics, while simultaneously developing workplace skills highly valued by employers. PSM programs consist of two years of academic training in an emerging or interdisciplinary area, along with a professional component that may include internships and "cross-training" in workplace skills, such as business, communications, and regulatory affairs.

Figure 19. PSM Requirements.

The total number of hours is 30 hours.

The degree has two modes of delivery, which share a common core and total credit hour requirement of 30 hours. The courses are marked to indicate advanced scientific content (S), professional content (P), or experiential content (E). Both delivery frameworks ensure that students receive a mix of professional, technical, and experiential experiences. Figure 20 maps the courses into the PSM framework. If a student does not have adequate work experience, additional opportunities for experience are available. For example, a one-semester, 3-credit-hour internship—EIN 6946 Internship (3 credit hours) is available.

Required Courses (18 credit hours)

- ESI 5219 Engineering Statistics (S, 3 credit hours)
- EIN 5140 Project Engineering (P, 3 credit hours)
- ESI 6551C Systems Engineering (S, 3 credit hours)
- EIN 6357 Advanced Engineering Economic Analysis (S, 3 credit hours)
- EIN 5108 The Environment of Technical Organizations (P, 3 credit hours)
- EIN 6182 Engineering Management (E, 3 credit hours)

The on-campus (Orlando) delivery allows more flexibility, with the remaining 9 credit hours being fulfilled from the following set of electives:

Restricted Electives—12 Credit Hours

Select 3 courses from the following courses.

- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 5251 Usability Engineering (3 credit hours)
- EIN 6339 Operations Engineering (3 credit hours)
- EIN 6224 Quality Management (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- EIN 6528 Simulation-based Life Cycle Engineering (3 credit hours)
- EIN 5356 Cost Engineering (3 credit hours)
- EIN 6326 Technology Strategy (S, 3 credit hours)
- EIN 6936 Seminar in Advanced Industrial Engineering (S, 3 credit hours)
- EIN 6935 Special Topics (e.g., Technical Communication) (P, 3 credit hours)
- EIN 6946 Internship (E, 3 credit hours)

The cohort curriculum is designed with a structured delivery. In addition to the required courses, the cohort curriculum is completed with the following set of courses:

- EIN 6459 Concurrent Engineering (P, 3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- EIN 6326 Technology Strategy (S, 3 credit hours)
- EIN 6936 Seminar in Advanced Industrial Engineering (S, 3 credit hours)

The degree framework ensures that students seek a mix of professional and technical courses and experiential experiences. Figure 20 maps the courses into the PSM framework.

The professional courses are:

- EIN 6459 Concurrent Engineering
- EIN 6935 Special Topics (e.g., Technical Communication)
- EIN 5140 Project Engineering
- EIN 5108 Environment of Tech Orgs

The science courses are:

- EIN 6326 Technology Strategy
- ESI 5219 Statistics
- EIN 6936 Decision Analysis
- EIN 6551C Systems Engineering
- EIN 6357 Advanced Engineering Economic Analysis

The experiential nature of the program is met through

- EIN 6182 Engineering Management.

If a student does not have adequate work experience additional opportunities for experience are available. For example, a one-semester, 3-credit-hour internship—EIN 6946 Internship (3 credit hours) is available.

Figure 20. Mapping of MS in Engineering Management-PSM Courses into PSM Framework

To further describe the curriculum, the following are described for the cohort-based program:

- Reflective Learning Approach
- The Integrated Case Project Approach to Support Experiential Learning
- Connection and Flow of Application Sessions
- Electronic Support Elements
- Administration and Routine Evaluation.

The Reflective Learning Approach

To support the overall approach to meet the educational objectives, we are using a reflective learning approach. This approach is based on previous research of applying the cooperative learning principles to an entire course (Kotnour & Landaeta, 2007). The Kolb learning cycle emphasizes the four phases an adult learner uses to learn (see Figure 21). The program will use these concepts to help build reflective practitioners.

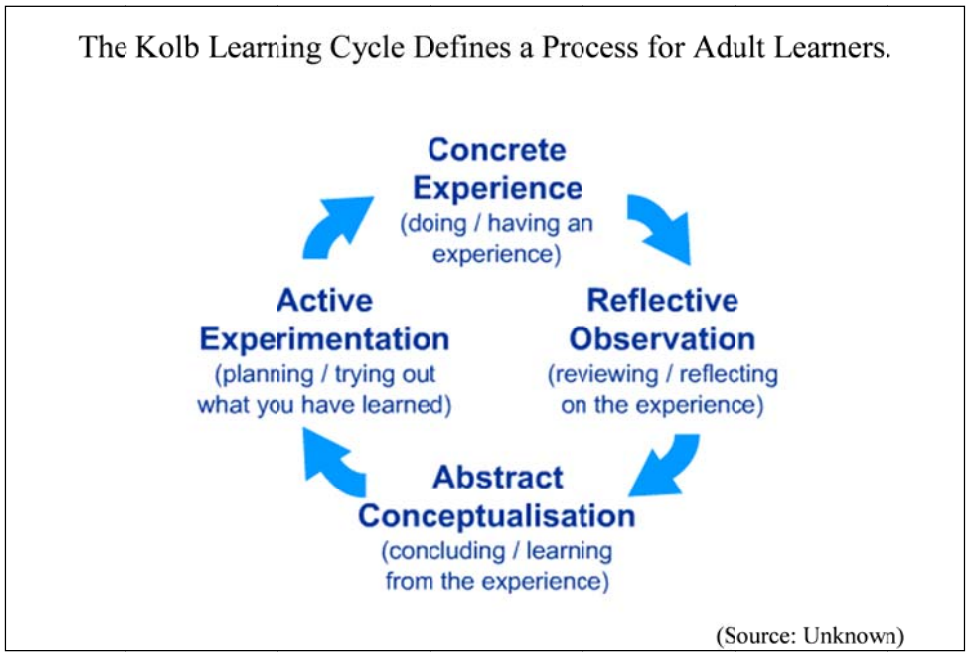


Figure 21. Kolb learning cycle.

We conduct the reflective learning exercise to 1) help the students internalize the material, 2) help the students reflect on the individual and team learning and how they apply to their current situation, and 3) to help the students become reflective practitioners. To implement this approach the following assignments can be used:

1. Pre-Class Readings
2. In-class Working Session Discussions
3. Individual Course Paper
4. Entire Program Paper
5. Course Group Project Deliverable
6. Final Group Project Report.

Figure 22 summarizes the intent of each of the elements.

		Pre-Class Readings	In-class Working Session Discussions	Individual Course Paper	Entire Program Paper	Course Group Project Deliverable	Final Group Project Report
Intent of the Exercise	Provide meaningful feedback to the student			✓	✓	✓	✓
	Help the student better apply the concepts to their workplace		✓				
	Help the students adjust the group project					✓	✓
	Reinforce the students completion of the necessary reading and reflection	✓					
	Provide a measure to provide a grade.	✓	✓	✓	✓	✓	✓

Figure 22. Role of Exercises in Building a Reflective Practitioner

To implement this reflective learning approach, students need to complete a reflective learning exercise for each reading, exercise, and course. Figure 23 provides examples of reflective learning exercises for each assignment type.

Assignment	**Example Reflective Learning Approach**
Pre-Class Readings	• What did you learn from the reading? • How can you use these learnings in your workplace?
In-class Working Session Discussions	• What did you learn from the discussion? • How can you use these learnings in your workplace?
Individual Course Paper	• Specific questions related to the topic • How can you use these learnings in your workplace?
Entire Program Paper	• What did you learn from the program about delivering solutions? • How can you use these learnings in your workplace?
Course Group Project Deliverable	• What did you learn from doing this section of the project? • How can you use these learnings in your workplace?
Final Group Project Report.	• What did you learn about project delivery from the completing the entire project? • How can you use these learnings in your workplace?

Figure 23. Reflective Learning Assignments

The Integrated Case Project Approach to Support Experiential Learning & Capstone Course

To support the overall approach to meet the educational objectives, we are using an integrated project throughout the program. The intent of the project is to provide a common focus to use throughout the program and to provide a means for the students to directly apply the concepts in each course. Each course will provide a piece of the puzzle to complete the entire project. Each course will focus on and provide the tools necessary to complete the program-wide project to integrate the concepts from each course. Figure 24 provides a visual of this approach.

Throughout the program, students complete a team project. The team project is utilized in each course. Each course builds from previous courses for the project. For example, in the first course the students complete the "first chapter" of the project. In the second course, the students use the results from the first course and the new learnings to complete the "second chapter" of the project. This approach is consistent with the stage-gate process used in projects and engineering organizations. The students work in teams to complete these projects.

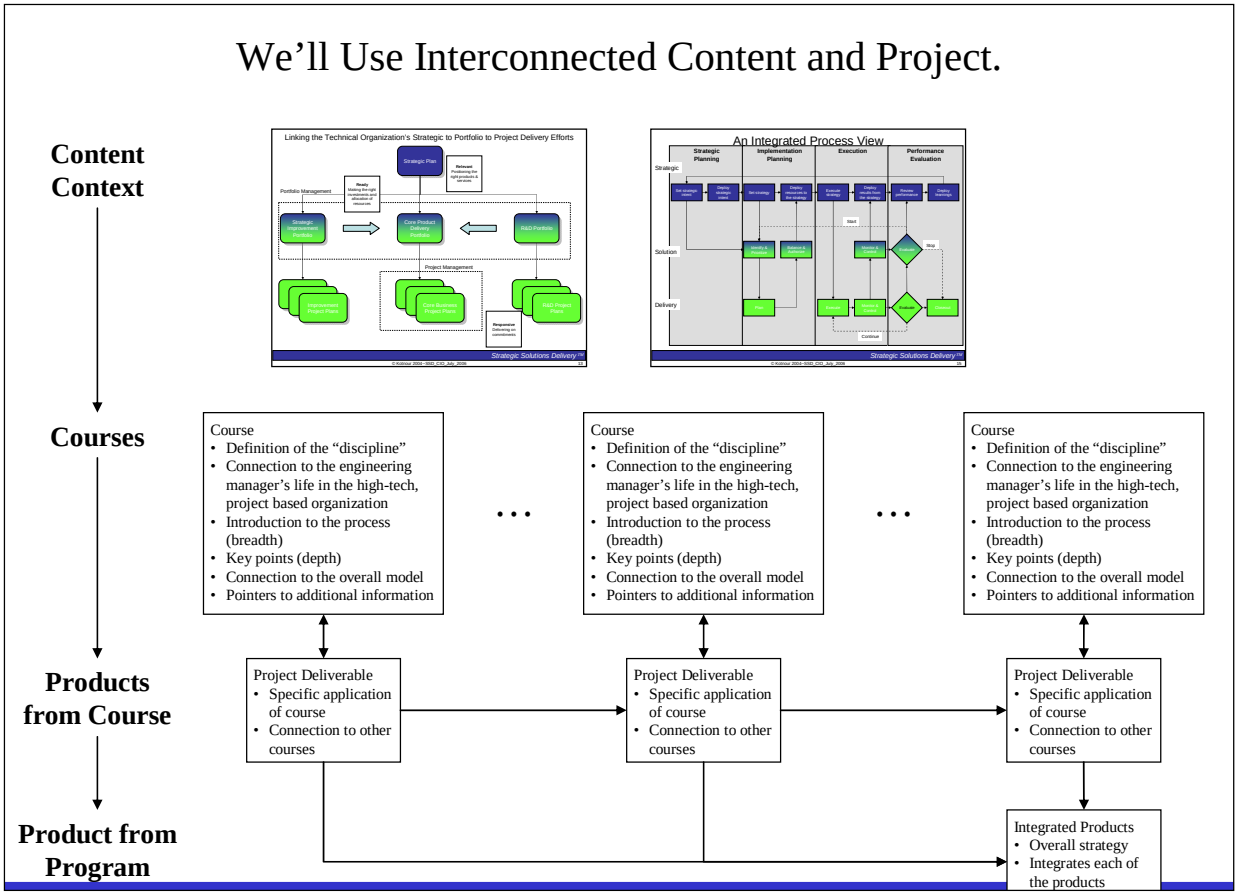


Figure 24. Interconnected Project Across Courses Leads to a Capstone Project

The project is used by the students to apply the course concepts to. As shown in Figure 24, the group project will produce a project plan. Figure 25 provides a graphical look to these elements of the project plan. In the final capstone project (completed as part of EIN 6182), the students integrate the learnings from the previous courses to develop an integrated project plan to deliver a solution to an organization's problem. Each of the courses provides a piece of the knowledge and tools necessary to develop this integrated capstone project plan.

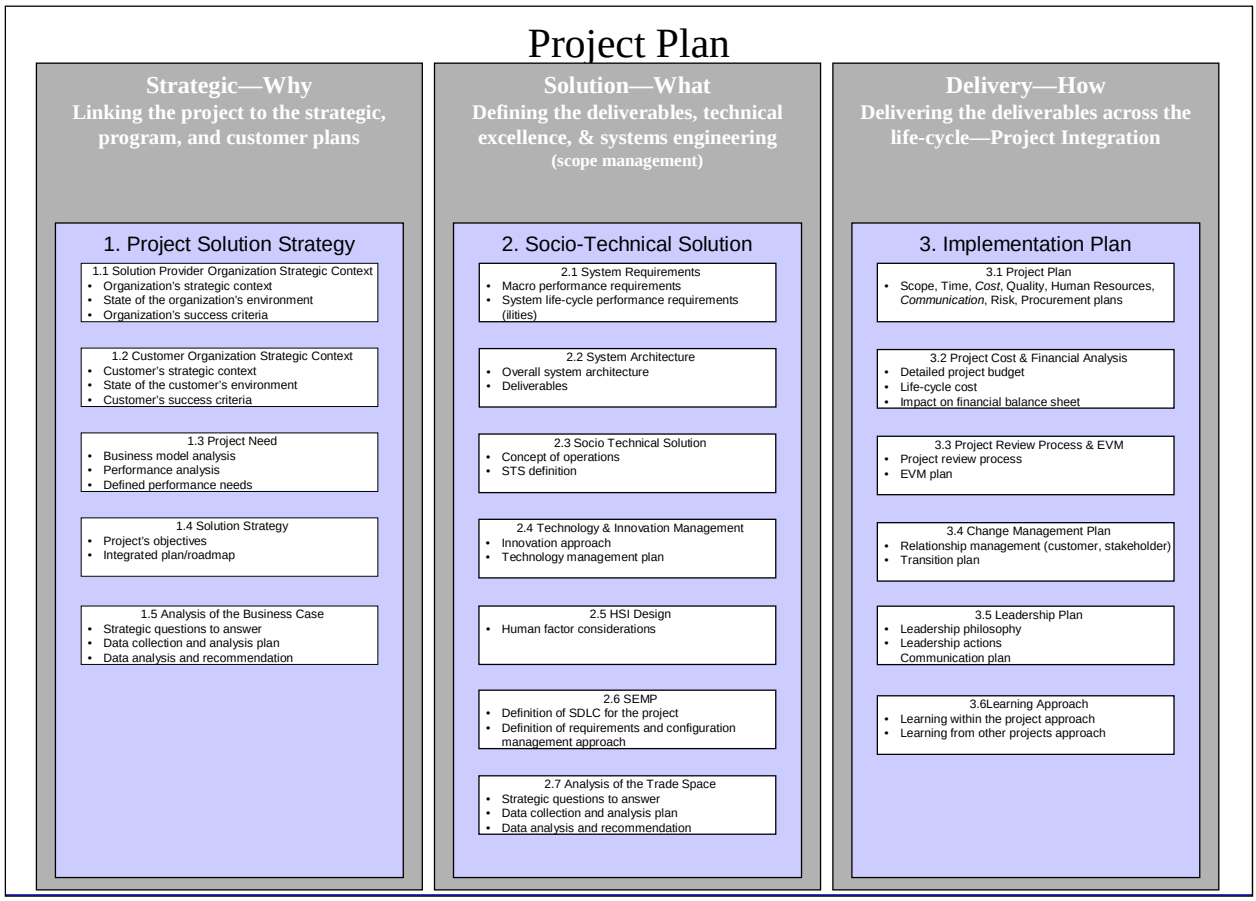


Figure 25. Capstone Project Plan Elements

Connection and Flow of Application Sessions for the Cohort-Based Groups

Each course offered using the cohort model lasts for seven weeks. The cohort based groups meet during all day sessions every other week. We have developed procedures to make it easier to take the course and complete it using this format, since it is better for working professionals to concentrate on one course at a time.

To implement the program we need to make sure we "take" the students through the flow, provide continuity between courses, and learn/adapt the program. We take three steps to take the students through the flow and to provide the continuity throughout the program:

1) Start the program with a half-day introduction
   a) Introduce the teachers
   b) Introduce the website
   c) Setup the overall flow of the program and how the courses are related
   d) Go over the course project portfolio
   e) Setup the work to do for the first course
2) Provide a visual map of how the courses are related.
3) Have the faculty make a handoff between the courses (e.g., have the faculty for the next course attend the last hour of the current course to setup the new course).
   - First ½ application session
     - Connect the course to the overall model
     - Discuss how previous courses fits into what this course is going to do
     - Discuss how the current course uses the previous courses
     - Setup work to complete
   - Second application session
     - Share course materials
     - Conduct cases
     - Answer questions from the video lectures and readings
     - Discuss lessons from applying the concepts in the workplace
     - Demonstrate concepts needed for the group project
   - Third application session
     - Share course materials
     - Conduct cases
     - Answer questions from the video lectures and readings
     - Discuss lessons from applying the concepts in the workplace
     - Demonstrate concepts needed for the group project
   - Fourth application session
     - 1st half is a recap of the product from the current course
       - Review of the products from this course
     - 2nd half is a setup for the new course.

Figure 26 shows the flow of courses from one course to the next.

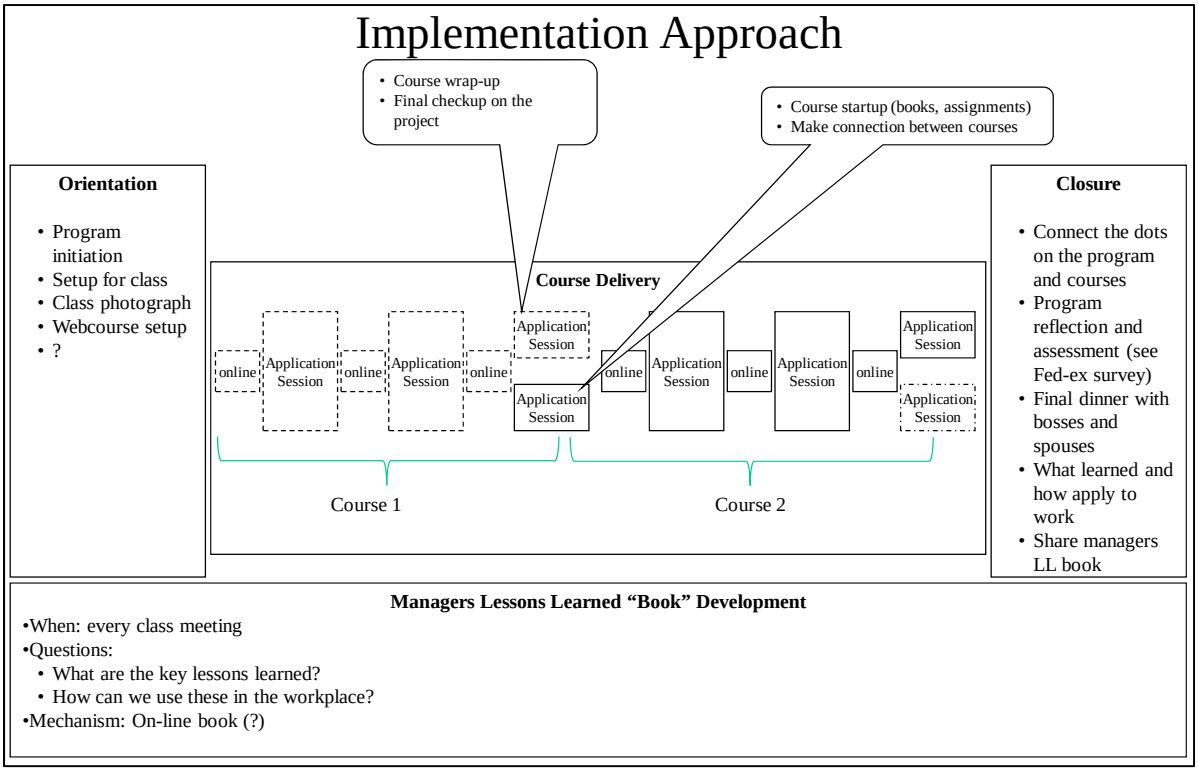


Figure 26. Flow of Course Meetings

Electronic Support Elements

As shown in Figure 27, the program will be supported using technology. The role of the technology is to provide a mechanism to:

- Share content with the students
- Record and share the lectures to support the concepts that will be applied in the application sessions
- Enable students to communicate and learn with each other.

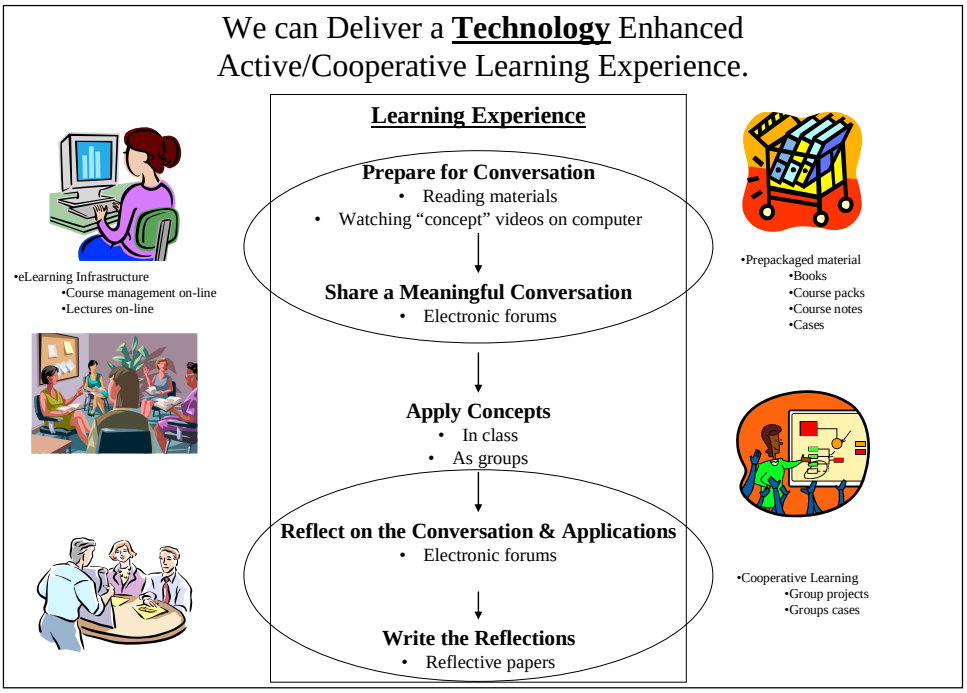


Figure 27. Role of Technology

Administration and Routine Evaluation for the Cohort-Based Program

To continuously learn and adapt the program we implement four methods to gather feedback about the program:

1) Lecture PDSA feedback
2) Between course professor handoff and discussion
3) Mid program assessment
4) End of program assessment.

These assessment approaches provide ongoing mechanisms to understand how we can adjust and improve the MSEM.

D. Provide a sequenced course of study for all majors, concentrations, or areas of emphasis within the proposed program.

As shown in Figure 28, the MS in Engineering Management-PSM would be offered in the traditional fashion on-campus at the Orlando campus. Concurrent with the traditional approach are the cohort-based offerings. These offerings will be held at locations such as the Kennedy Space Center (KSC), Palm Bay, and Research Park.

A proposed sequenced course of study for the cohort-based offering is as follows:

- Semester 1
  - EIN 6326 Technology Strategy
  - ESI 5219 Engineering Statistics
  - EIN 6459 Concurrent Engineering
- Semester 2
  - ESI 6358 Decision Analysis
  - ESI 6551C Systems Engineering
  - EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication
- Semester 3
  - EIN 5140 Project Engineering
  - EIN 6357 Advanced Engineering Economic Analysis
- Semester 4
  - EIN 5108 The Environment of Technical Organizations
  - EIN 6182 Engineering Management.

		Orlando	KSC Cohort	Palm Bay Cohort	Research Park Cohort
Year 1	Fall 2011	• EIN 5140 Project Engineering (Calabrese) • EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)		• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)
	Spring 2012	• EIN 5140 Project Engineering (Calabrese) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)	• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)
Year 2	Summer 2012	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • ESI 5219 Engineering Statistics (Williams)	• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)		• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)
	Fall 2012	• EIN 5140 Project Engineering (Calabrese) • EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)		• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)
	Spring 2013	• EIN 5140 Project Engineering (Calabrese) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)	•
Year 3	Summer 2013	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • ESI 5219 Engineering Statistics (Williams)		• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)
	Fall 2013	• EIN 5140 Project Engineering (Calabrese) • EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)	• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)	• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)
	Spring 20144	• EIN 5140 Project Engineering (Calabrese) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)	• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)

Figure 28. Schedule of Courses

		Orlando	KSC Cohort	Palm Bay Cohort	Research Park Cohort
Year 4	Summer 2014	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • ESI 5219 Engineering Statistics (Williams)	• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)		• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)
	Fall 2014	• EIN 5140 Project Engineering (Calabrese) • EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)	•
	Spring 2015	• EIN 5140 Project Engineering (Calabrese) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)		• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)
Year 5	Summer 2015	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • ESI 5219 Engineering Statistics (Williams)	• EIN 6326 Technology Strategy (Kotnour) • ESI 5219 Engineering Statistics (Nazzal) • EIN 6459 Concurrent Engineering (Hoekstra)	• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)	• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)
	Fall 2-15	• EIN 5140 Project Engineering (Calabrese) • EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6357 Advanced Engineering Economic Analysis (Thompson) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• ESI 6358 Decision Analysis (Mollaghasemi) • ESI 6551C Systems Engineering (Adjunct) • EIN 6936 Seminar in Advanced Industrial Engineering—Technical Communication (Adjunct)	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)	• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)
	Spring 2016	• EIN 5140 Project Engineering (Calabrese) • EIN 6182 Engineering Management (Calabrese) • ESI 6551C Systems Engineering (Sala-Diakanda) • ESI 5219 Engineering Statistics (Williams)	• EIN 5140 Project Engineering (Kotnour) • EIN 6357 Advanced Engineering Economic Analysis (Adjunct)	•	• EIN 5108 The Environment of Technical Organizations (Hoekstra) • EIN 6182 Engineering Management (Kotnour)

Figure 28. Schedule of Courses

E. Provide a one- or two-sentence description of each required or elective course.

The required and potential course descriptions are provided below:

EIN 5108. The Environment of Technical Organizations 3(3,0). PR: Graduate status or CI; EGN 4624 recommended. Presentation and investigation into the principles required to transform technologists into managers focusing on engineers, scientists, and other professionals providing services in technically-oriented organizations. Fall, Summer. ECS-Industrial & Management
EIN 5117. Management Information Systems I 3(3,0). PR: C.I. The design and implementation of computer-based Management Information Systems. Consideration is given to the organizational, managerial, and economic aspects of MIS. Spring, Summer. ECS-Industrial & Management
EIN 5140. Project Engineering 3(3,0). PR: Graduate standing or C.I. Role of engineer in project management with emphasis on project life cycle, quantitative and qualitative methods of cost, schedule, and performance control. Fall, Spring, Summer. ECS-Industrial & Management
EIN 5356. Cost Engineering 3(3,0). Cost estimation and control of engineering systems throughout the product life cycle. Spring. ECS-Industrial & Management
EIN 6182. Engineering Management 3(3,0). PR: EIN 5117, EIN 5356 or EIN 6357, and EIN 5140. Capstone investigation and analysis of topics for improving engineering enterprises in national and international competitive environments. Quantitative engineering tools/methods will be used. Fall, Spring. ECS-Industrial & Management
EIN 6326. Technology Strategy 3(3,0). PR: Graduate status. This course is designed to expose engineering management students to cutting edge tools and concepts for managing technology and product strategy. May be repeated for credit. Occasional. ECS-Industrial & Management
EIN 6336. Production and Inventory Control 3(3,0). PR: EIN 4333C or equivalent. Review of models and techniques used in forecasting, production control and inventory control. Includes aggregate planning, production scheduling, inventory management, models, etc. Spring. ECS-Industrial & Management
EIN 6339. Operations Engineering 3(3,0). PR: EIN 6357, ESI 5306, or C.I. Methods and models for design, management, and control of operational processes in engineering and technical organizations. Includes considerations of quality, productivity, performance, benchmarking, constraints, and strategy. Fall. ECS-Industrial & Management

EIN 6357. Advanced Engineering Economic Analysis
3(3,0). PR: EGN 3613; STA 3032 or equivalent. Topics include measuring economic worth, economic optimization under constraints. Analysis of economic risk and uncertainty, foundations of utility functions.
Fall, Summer.
ECS-Industrial & Management

EIN 6459. Concurrent Engineering
3(3,0). Elements of concurrent engineering and its applications. Topics include quality function deployment, design for manufacturability, and design for assembly
Odd Spring.
ECS-Industrial & Management

EIN 6528. Simulation Based Life Cycle Engineering
3(3,0). PR: EIN 5255C or IDS 5717C or EIN 5117. This course examines the phenomenon of simulation based life cycle engineering. Case studies illustrate infrastructure and organization change necessary to gain operational and strategic advantage.
Even Summer.
ECS-Industrial & Management

EIN 6933. Systems Acquisition
3(3,0). What the engineer needs to know about the systems acquisition process when dealing with government contracting agencies
Occasional.
ECS-Industrial & Management

EIN 6934. Contract Negotiations
3(3,0). PR: EIN 6933. A seminar on the contract negotiation phase of systems acquisition for the United States government; contract formulation and acquisition process management is emphasized.
Occasional.
ECS-Industrial & Management

EIN 6936. Seminar in Advanced Industrial Engineering
3(3,0). Topical seminar. Potential topic areas include quality function deployment, axiomatic design, design quality, benchmarking, re-engineering processes.
Occasional.
ECS-Industrial & Management

ESI 5219. Engineering Statistics
3(3,0). PR: C.I. Discrete and continuous probability distributions, hypothesis testing, regression, nonparametric stats and ANOVA.
Fall, Spring, Summer.
ECS-Industrial & Management

ESI 5227. Total Quality Improvement
3(3,0). PR: STA 3032 or equivalent. Quality improvement (QI) tools and techniques, advanced QI techniques, quality improvement systems, total quality management concepts and implementation, planning and management tools, and case studies.
Odd Fall.
ECS-Industrial & Management

ESI 5236. Reliability Engineering
3(3,0). PR: ESI 4234 or equivalent, or C.I. Reliability theory and modeling approaches. Topics include: failure data analysis, maintainability, reliability standards (DOD), software reliability, reliability in design, and electronic systems reliability.
Fall.
ECS-Industrial & Management

ESI 5306. Operations Research
3(3,0). PR: STA 3032. Methods of operations research, including formulation for models and derivation of solutions; linear programming, network models queueing theory, simulation, and nonlinear optimization techniques.
Fall.
ECS-Industrial & Management

ESI 5359. Risk Assessment and Management
3(3,0). PR: ESI 5219 or STA 3032. Problems and complexities involved in risk assessment and management. Selected methodologies are illustrated through realistic applications in engineering and the sciences.
Occasional.
ECS-Industrial & Management

ESI 5531. Discrete Systems Simulation
3(3,0). PR: STA 3032. Methods for performing discrete systems simulation, including network modeling, will be treated.
Spring, Summer.
ECS-Industrial & Management

ESI 6224. Quality Management
3(3,0). PR: STA 3032 or equivalent or C.I. Philosophy and concepts of quality management, organization for quality, quality cost, quality audits and corrective actions, tools and techniques for improvement.
Summer.
ECS-Industrial & Management

ESI 6225. Quality Design and Control
3(3,0). PR: STA 3032 or equivalent. Concepts and methods for quality design and control, including statistical process control (SPC), control charts, process capability, product and process design and improvement, Taguchi methods, case studies. May be repeated for credit.
Spring.
ECS-Industrial & Management

ESI 6247. Experimental Design and Taguchi Methods
3(3,0). PR: STA 3032 or ESI 4234. Introduction to Taguchi Concepts and Methodologies, use of design of experiments for quality design and improvement.
Spring.
ECS-Industrial & Management

ESI 6358. Decision Analysis
3(3,0). PR: ESI 4312 or ESI 5306. Classical Bayesian analysis; utility and its measurement; multiattribute utility methods; influence diagrams; Analytic Hierarchy Process; behavioral aspects; simulation.
Fall.
ECS-Industrial & Management

ESI 6551C. Systems Engineering
3(2,2). PR: ESI 4312 or ESI 5306. Integration and application of systems science, operations research, systems methodologies, and systems management for the design, production, and maintenance of efficient, reliable systems.
Fall.
ECS-Industrial & Management

ESI 6891. IEMS Research Methods
3(3,0). PR: ESI 5219. Assist students in producing publishable research and to introduce new tools which may be needed for collection and analysis of research data.
Even Spring.
ECS-Industrial & Management

F. For degree programs in the science and technology disciplines, discuss how industry-driven competencies were identified and incorporated into the curriculum and identify if any industry advisory council exists to provide input for curriculum development and student assessment.

The development of this program was driven by industry involvement. As part of the CECS Engineering Leadership and Innovation Institute, there is regular involvement and interaction with industry. For example, the institute runs a Chief Information Officer Community of Practice. This group has the following organizations as members:

- Campus Crusade for Christ International
- Darden Restaurants
- Harris Corp.
- HD Supply
- Siemens Energy
- The Boeing Company
- Walt Disney World.

They were involved in reviewing the proposed curriculum. Furthermore, organizations such as Siemens, WDW, Lockheed Martin, Harris Corporation, and KSC were involved in shaping the curriculum. The Dean's Advisory Board, the IEMS Advisory Board, and the emerging partners of the CECS Engineering Leadership and Innovation Institute all serve an advisory role to the program.

Appendix II provides the names of the external advisory board for the MSEM. Appendix III contains support letters from industry.

G. For all programs, list the specialized accreditation agencies and learned societies that would be concerned with the proposed program. Will the university seek accreditation for the program if it is available? If not, why? Provide a brief timeline for seeking accreditation, if appropriate.

The American Society of Engineering Management (ASEM) offers certification of graduate programs in Engineering Management. We will pursue certification by ASEM in Fall 2013. ASEM reviews programs within four areas: faculty, curriculum requirements, admission requirements, and administrative support. The curriculum requirements are:

- A balance between qualitative and quantitative courses
- At least one third of the curriculum will be management and management related courses.
- Courses designated "Engineering Management" are in the academic catalog.
- Course material must be directly related to technology driven organizations.
- The curriculum must require each student to demonstrate a command of written and oral communication skills in English.
- Courses must relate to knowledge workers in a global environment.
- Each student is required to perform a capstone project or thesis using analysis and integration of Engineering Management concepts.
- A minimum of one course in probability and statistics
- A minimum of one course in engineering economy
- Two courses in quantitative analysis courses are required.

Based on our internal assessment, we believe we have the necessary elements to be certified by ASEM.

H. For doctoral programs, list the accreditation agencies and learned societies that would be concerned with corresponding bachelor's or master's programs associated with the proposed program. Are the programs accredited? If not, why?

Not applicable.

I. Briefly describe the anticipated delivery system for the proposed program (e.g., traditional delivery on main campus; traditional delivery at branch campuses or centers; or nontraditional delivery such as distance or distributed learning, self-paced instruction, or external degree programs). If the proposed delivery system will require specialized services or greater than normal financial support, include projected costs in Table 2. Provide a narrative describing the feasibility of delivering the proposed program through collaboration with other universities, both public and private. Cite specific queries made of other institutions with respect to shared courses, distance/distributed learning technologies, and joint-use facilities for research or internships.

The delivery of the program will be through two avenues:

1. **Traditional Track Delivery**: This track is delivered in the traditional classroom setting and via webcourses. CECS has had a long-standing approach for distance education (e.g., FEEDS). The traditional offering is offered on the main campus and via remote locations via webcourses.
2. **Cohort-Based Delivery**: This is offered in an integrated fashion with distance learning (i.e., webcourses) and on-site locations (i.e., Regional Campuses). The support for this service from Regional Campus is reimbursed from funds generated from the program's tuition and fees. No additional expense is incurred by Regional Campuses. The cohort-based program is delivered with a combination of:
    a. Webcourses: students are provided with online lectures and reading materials.
    b. Live-application sessions: students work with the professor during 8 hour application session where cases and projects are worked to better understand and apply the material presented in the webcourses.

    Throughout the program, students complete a team project. The team project is utilized in each course. Each course builds from previous courses for the project. For example, in the first course the students complete the "first chapter" of the project. In the second course, the students use the results from the first course and the new learnings to complete the "second chapter" of the project. This approach is consistent with the stage-gate process used in projects and engineering organizations. The students work in teams to complete these projects.

Please see section "VIII Curriculum C"- For further details.

IX. Faculty Participation

A. Use Table 4 to identify existing and anticipated ranked (not visiting or adjunct) faculty who will participate in the proposed program through Year 5. Include (a) faculty code associated with the source of funding for the position; (b) name; (c) highest degree held; (d) academic discipline or specialization; (e) contract status (tenure, tenure-earning, or multi-year annual [MYA]); (f) contract length in months; and (g) percent of annual effort that will be directed toward the proposed program (instruction, advising, supervising internships and practica, and supervising thesis or dissertation hours).

We have eight faculty involved in the MS in Engineering Management-PSM program. All contribute to teaching in the on-campus and cohort based delivery modes. All are highly qualified faculty members, the strengths of each are:

- Dr. Robert Hoekstra focuses on creativity and project team leadership. He has an extensive design background and has led a design organization.
- Dr. Bill Thompson focuses on cost analysis. He has an extensive background in industry as a former Vice President in a major corporation., He helps students see the importance of economics in the corporate world.
- Mark Calabrese focuses on project management and engineering management. He was a former executive in a high-tech, project-based organization.
- Dr. Tim Kotnour focuses on technology strategy, project delivery and strategic management. He has worked with leaders in technical organizations to transform the project-based organization.
- Dr. Mansooreh Mollaghasemi focuses on quantitative decision analysis. She has extensive experience in modeling decisions for high-tech projects.
- Dr. Dima Nazzal focuses on statistical analysis of business decisions. She delivers a course that is relevant and useful to engineering professionals who need to understand how to use statistics to make a business decision.
- Dr. Serge Sala-Diakanda focuses on systems engineering. He understands modern systems engineering tools and their application to today's challenges.
- Dr, Kent Williams focuses on statistical analysis. He brings extensive experience in analyzing data for large research projects.

TABLE 4

ANTICIPATED FACULTY PARTICIPATION - Combined

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in the Program	Mos. Contract Year 1	FTE Year 1	% Effort for Prg. Year 1	PY Year 1	Mos. Contract Year 5	FTE Year 5	% Effort for Prg. Year 5	PY Year 5
A	Robert Hoekstra	Associate Pro	tenured	2011	9	0.75	44%	0.33	9	0.75	55%	0.41
A	Bill Thompson	Associate Pro	not tenured	2011	9	0.75	6%	0.04	9	0.75	11%	0.08
A	Mark Calabrese	Instructor	not tenured	2011	9	0.75	33%	0.25	9	0.75	33%	0.25
A	Serge Sala-Diakanda	Assistant Prof	visiting	2011	9	0.75	11%	0.08	9	0.75	11%	0.08
A	Kent Williams	Associate Pro	tenured	2011	9	0.75	11%	0.08	9	0.75	17%	0.12
A	Dima Nazzal	Assistant Prof	tenure- track	2011	9	0.75	22%	0.17	9	0.75	11%	0.08
A	Timothy Kotnour	Prof	tenured	2011	9	0.75	44%	0.33	9	0.75	66%	0.50
A	Mansooreh Mollaghasemi	Associate Pro	tenured	2011	9	0.75	11%	0.08	9	0.75	22%	0.17
	Total Person-Years (PY)							1.36				1.69

B. Use Table 2 to display the costs and associated funding resources for existing and anticipated ranked faculty (as identified in Table 2). Costs for visiting and adjunct faculty should be included in the category of Other Personnel Services (OPS). Provide a narrative summarizing projected costs and funding sources.

TABLE 2

PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 1 Funding Source						Year 5 Funding Source				
	Reallocated Base * (E&G)	Enrollment Growth (E&G)	Other New Recurring (E&G)	New Non-Recurring (E&G)	Contracts & Grants (C&G)	Subtotal E&G and C&G	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Subtotal E&G and C&G
Faculty Salaries and Benefits	$196,871	$0	$0	$0	$0	$196,871	$244,641	$0	$0	$0	$244,641
A&P Salaries and Benefits	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
USPS Salaries and Benefits	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Personnel Services	$0	$0	$0	$0	$107,250	$107,250	$0	$0	$0	$156,750	$156,750
Assistantships and Fellowships	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Library	$0	$5,312	$0	$0	$0	$5,312	$0	$0	$0	$0	$0
Expenses	$0	$0	$0	$0	$161,870	$161,870	$0	$0	$0	$241,686	$241,686
Operating Capital Outlay	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Special Categories	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Costs	$196,871	$5,312	$0	$0	$269,120	$471,303	$244,641	$0	$0	$398,436	$643,077

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base", "enrollment growth", and "other new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring.

The projected costs are primarily faculty to teach the program. The Other Personnel Services costs are for a project manager and adjuncts to teach the courses in the cohort-based program. We use adjuncts to teach the cohort-based courses that IEMS is not the strongest at or does not have the resources to deliver both on and off-campus offerings. Example courses taught by adjuncts in the cohort program include: systems engineering, technical communication, and advanced cost engineering. The expenses are the expenses associated with the services provided to the cohort-based program (e.g., books, meals, computers). The students receive professional services such as automatic course registration, delivery of books to the classroom, and industrial scholars who share industry best practices. All the students need to focus on is learning.

In-load faculty will deliver the instruction for both the on-campus and cohort delivery modes, so these costs are shown in the E&G column. A portion of the supplemental fee revenue for the cohorts will be used to reimburse the College for faculty instruction time. C&G costs cover the cohort-based delivery. C&G costs cover the cohort-based delivery.

C. Provide the number of master's theses and/or doctoral dissertations directed, and the number and type of professional publications for each existing faculty member (do not include information for visiting or adjunct faculty).

Faculty Name	Theses Supervised	Dissertations Supervised	Professional Publications	Other Information
Tim Kotnour	6	7	Books: 1 Book Chapters: 4 Journal Papers: 17 Conference Papers: 35	
Robert Hoekstra	4	1	Books: 0 Book Chapters: 3 Journal Papers: 12 Conference Papers: 15	
Mansooreh Mollaghasemi	13	9	Books: 1 Book Chapters: 5 Journal Papers: 24 Conference Papers: 66	
Dima Nazzal	0	4 in progress	Books: 0 Book Chapters: 0 Journal Papers: 10 Conference Papers: 12	
Kent Williams	1	1	Books: 0 Book Chapters: 0 Journal Papers: 14 Conference Papers: 61	
Bill Thompson	2	1	Books: 0 Book Chapters: 0 Journal Papers: 2 Conference Papers: 13	Extensive senior management professional experience
Serge Sala-Diakanda	0	0	Books: 0 Book Chapters: 0 Journal Papers: 5 Conference Papers: 14	
Mark Calabrese	0	0	0	Extensive senior management professional experience

D. Provide evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service. Such evidence may include trends over time for average course load, FTE productivity, student HC in major or service courses, degrees granted, external funding attracted, as well as qualitative indicators of excellence.

Since 2007, IEMS Department has embarked on the path towards excellence in teaching, research and service, including the following:

UG TEACHING

- UG student population has increased from 165 in 2008 to 291 in Fall 2010 and is still growing. We expect our UG enrollment to exceed 300 in Fall 2011.
- IEMS implemented accelerated BS to MS program for our best students.
- ABET accredited (2008) UG curriculum is being continuously enhanced and revised to better prepare UG students for graduate programs.
- UG students have been receiving awards and recognitions at the regional and national levels

<u>IIE Student Award of Excellence (International-level Competition):</u>
2010: Ms. Alyson (Aly) Pfeifer (2nd Place)
2009: Mr. Omar Nassereddin (3rd Place)

Note: The IIE International Student Award for Excellence honors "...undergraduate students who, since the beginning of their junior year (last six quarters or four semesters), have distinguished themselves through excellence of scholarship and campus leadership"

<u>IIE Student Technical Paper Competition (Regional-level Competition):</u>
2011: Mr. Adam Baligian (3rd Place)
2008: Mr. Kevin Lowry (2nd Place)
2007: Ms. Kelly Sprehn (3rd Place)

- IEMS completed a large NSF project aimed at on developing a model for UG curriculum redesign to fit the needs of the future.
- IEMS implemented a new minor in Engineering Leadership in 2007.

GRADUATE TEACHING

- IEMS has currently the largest M/S / MSIE level program in the CECS and attract many non-traditional students from industry:
  - 156 MS students
  - 25 MSIE students
  - 81 Ph.D. IE students

- IEMS had the largest number of MS/MSIE degrees awarded in the college in 2006-2007, 2008-09, and 2009-10:

  1. 2005-06: 56 - 2nd largest
  2. 2006-07: 50 – the largest in CECS
  3. 2007-08: 39 - 2nd largest
  4. 2008-09: 59 - the largest in CECS
  5. 2009-10: 65 - the largest in CECS

- Developed a new track on Systems Engineering for our MS program (now with 7 tracks).

- Developed and implemented MS Professional Engineering Management Program.

- IEMS faculty supports the Interdisciplinary Modeling and Simulation Program, and a new UCF/ERAU PSM in Modeling and Simulation

- MS and PhD curricula have recently been restructured to better fit the modern IE needs.

- Graduate students are offered the opportunity for the six sigma green belt certification through enrollment in the quality engineering/total quality improvement course and completing project and course requirements.

RESEARCH

- IEMS faulty have significantly increased their efforts to publish papers in peer review journals and present papers at high quality national and international conferences.
- IEMS research productivity measured by funded research grants and journal publications in 2010 exceeded the 2007 level despite the loss of 8 faculty members (including two of our best researchers since July 1, 2007 (we have added only 2 non-tenured faculty lines since that time).
- Graduate students have been receiving awards and recognitions at the regional and national levels:
  - American Society for Quality Scholarships (National-level Competition)
  - 2008: Mr. Amar Thiraviam - ASQ Freund International Scholarship Recipient
  - IEEE Scholarships (National-level Competition)
  - 2008: Mr. Narasimha Raju Nagaiah – Reliability Society Scholarship Recipient
  - IIE Scholarships (National-level Competition):
  - 2009: Mr. Samiullah Durrani – Zaken Award Recipient

SERVICE

- IEMS faculty provide invaluable service to many national and international professional organizations, bringing due recognition to IEMS Department worldwide.

  IIE Regional Leadership Board
  2010-2013: Dr. Christopher D. Geiger appointed as the Assistant Vice-President for Student Development for the Southeast Region, which includes the IIE university chapters in Georgia, Florida, Alabama, Mississippi, Louisiana and Puerto Rico.

- Student chapters, including IIE, ASQ, SME and INCOSE are very active, and benefit from excellent faulty advising.

  IIE International Chapter Recognition
  UCF Student Chapter has received several recognitions in the IIE International Chapter Recognition program. The IIE International Chapter Recognition program recognizes student chapters that support its members through continuing education, conferences, seminars, and networking activities to advance their knowledge base and empower them to influence positive changes in the industry and the industrial engineering profession. The UCF IIE Student Chapter received the following chapter recognition awards:
  - 2007 Silver Award
  - 2008 Gold Award (*highest distinction for an undergraduate IIE student chapter*)
  - 2009 Gold Award (*highest distinction for an undergraduate IIE student chapter*)
  - 2010 Gold Award (*highest distinction for an undergraduate IIE student chapter*)

  IIE Applied Ergonomics Student Design International Competition
  UCF Student Design Team won 3rd Place Honors at the 2008 Applied Ergonomics Student Design International Competition, Orlando, FL (5 teams from 2 countries participated).

- In 2010 IEMS revitalized our dormant student chapter of Alpha Pi Mu (IE Honorary society) – Currently there are 34 initiated members.

X. Non-Faculty Resources

A. Describe library resources currently available to implement and/or sustain the proposed program through Year 5. Provide the total number of volumes and serials available in this discipline and related fields. List major journals that are available to the university's students. Include a signed statement from the Library Director that this subsection and subsection B have been reviewed and approved for all doctoral level proposals.

Appendix IV provides a review of the current holdings and ability to support the program. The summary is as follows:

- **Databases:** UCF Libraries have the databases necessary to support the Master's degree program in Engineering Management.

- **Journal titles**: UCF Libraries have the current journals necessary to support the proposed Master's program.

- **Book collection:** UCF compares favorably or better with the other peer institutions in almost all areas. The only area where UCF holdings was significantly lower when compared to another library was in Project Management. University of Florida holds more titles, at least 460 more, under this subject heading. To catch up, UCF needs to purchase at least an additional 100 titles, published in the last 2 years including future publications to keep the collection up-to-date. These books cost $10,312.00 and should be purchased with program monies if the program is approved. (According to the 2010 Library and Book Trade Almanac, the average cost of Engineering and Technology academic books in 2008 was $103.12.)

B. Describe additional library resources that are needed to implement and/or sustain the program through Year 5. Include projected costs of additional library resources in Table 3.

Appendix IV provides a review of the current holdings and ability to support the program. Minimal resources are needed:

- **Book collection:** UCF compares favorably or better with the other peer institutions in almost all areas. The only area where UCF holdings was significantly lower when compared to another library was in Project Management. University of Florida holds more titles, at least 460 more, under this subject heading. To catch up, UCF needs to purchase at least an additional 100 titles, published in the last 2 years including future publications to keep the collection up-to-date. These books cost $10,312.00 and should be purchased with program monies if the program is approved. (According to the 2010 Library and Book Trade Almanac, the average cost of Engineering and Technology academic books in 2008 was $103.12.)

Library Director Date

C. Describe classroom, teaching laboratory, research laboratory, office, and other types of space that are necessary and currently available to implement the proposed program through Year 5.

No additional space is needed for the program. Existing faculty offices will be used. No laboratory space is required.

D. Describe additional classroom, teaching laboratory, research laboratory, office, and other space needed to implement and/or maintain the proposed program through Year 5. Include any projected Instruction and Research (I&R) costs of additional space in Table 2. Do not include costs for new construction because that information should be provided in response to X (J) below.

No additional space is needed for the program. Existing faculty offices will be used. No laboratory space is required.

E. Describe specialized equipment that is currently available to implement the proposed program through Year 5. Focus primarily on instructional and research requirements.

No specialized equipment is needed.

F. Describe additional specialized equipment that will be needed to implement and/or sustain the proposed program through Year 5. Include projected costs of additional equipment in Table 2.
No specialized equipment is needed.

G. Describe any additional special categories of resources needed to implement the program through Year 5 (access to proprietary research facilities, specialized services, extended travel, etc.). Include projected costs of special resources in Table 2.

No specialized resources are needed.

H. Describe fellowships, scholarships, and graduate assistantships to be allocated to the proposed program through Year 5. Include the projected costs in Table 2.

The students are either self-funded or company supported, therefore no fellowships, scholarships, or graduate assistantships are needed. By company supported we mean the partnering organizations pay for the tuition. .

I. Describe currently available sites for internship and practicum experiences, if appropriate to the program. Describe plans to seek additional sites in Years 1 through 5.

The practicum experiences are the direct projects the students are conducting as part of each course spread across the entire program. Each course in the program has a project component to it. The final course, EIN 6182, is where the students integrate their projects experiences across the program into a final comprehensive project.

J. If a new capital expenditure for instructional or research space is required, indicate where this item appears on the university's fixed capital outlay priority list. Table 2 includes only Instruction and Research (I&R) costs. If non-I&R costs, such as indirect costs affecting libraries and student services, are expected to increase as a result of the program, describe and estimate those expenses in narrative form below. It is expected that high enrollment programs in particular would necessitate increased costs in non-I&R activities.

No capital expenditures are needed.

Appendix I
Letters of Departmental Support—IEMS

March 24, 2010

Dr. Patricia Bishop
Vice Provost and Dean Administration
The College of Graduate Studies
University of Central Florida

Re: MSEM program

Dr. Bishop:

The Industrial Engineering and Management Systems Department (IEMS) fully supports establishing of Master of Science in Engineering Management degree (MSEM), which will be designated as a "Professional Science Masters" degree. The curriculum of this degree will be focused on providing engineers the knowledge and skills to lead and manage complex project teams and engineering teams.

Sincerely,

Waldemar Karwowski, PE, D.Sc., Ph.D., CPE
IEMS, Professor and Chair

Appendix II
External Advisory Committee

An External Advisory Committee has been formed who will assist in the future development of the curriculum, and recruitment of students into the program.

Organization	Person
Siemens Power Generation	Antje Lembcke Director, Engineering Mike Sivick Manager, Training and Development
Walt Disney World	Dennis M. Lind, PE Vice President, Design & Engineering and IFP Strategy Global Facilities Operations Services Jim Marshall Manager, Segment Integrated Facility Planning
Kennedy Space Center	Miguel A. Rodriguez, Deputy Director for Management, Engineering and Technology Directorate Chair, Human Resources Advisory Board
Harris Corporation	Lilo Newberry VP Engineering & Strategic Development Jeff Nartatez Senior Engineering Manager
Lockheed Martin	Jeff Pridmore Director, Engineering Rob Frye Systems Engineering director Michele Van Dyke-Lewis, Ph.D. Systems Engineering Senior Manager

Appendix III Industry Letters of Support

SIEMENS

March 31, 2011

Tim Kotnour, PhD
University of Central Florida
Industrial Engineering & Management Systems
Orlando, FL 32816

Dear Dr. Kotnour,

I am writing this letter to provide industry support of your Master of Science in Engineering Management (MSEM) degree at the University of Central Florida.

We have participated with you in developing and implementing the cohort-based program. The program provides the needed skills and tools for our upcoming project managers, advanced program engineers, and technical leads. The program offers a unique opportunity for our engineers to build the necessary professional and leadership skills to transition to management and leadership positions.

We appreciate the opportunity to have worked with you and help shape the program. The students who participated in the program were impacted immensely. We look forward to continuing to work with UCF on shaping the MSEM.

Sincerely,

Antje Lembcke
Director Engineering

Vinod Philip
Director Engineering

Mike Sivick
Manager, Training & Development

Siemens Energy, Inc.

4400 Alafaya Trail
Orlando, FL 32826

Dr. Timothy Kotnour,

I am writing this letter to provide my continued support of the Master of Science in Engineering Management (MSEM) degree at the University of Central Florida. I concur with the recommended degree name change from "Master of Science" to "Master of Science in Engineering Management."

I have participated with you and your colleagues in providing recommendations for enhancing the program, as I was very fortunate to have graduated with the first cohort in May 2010. I am convinced that the program provides core skills and tools for upcoming project managers, program engineers and technical staff. The PEMP program offers a very unique opportunity for our engineers and technical cast in building the necessary professional and leadership skills to transition to management and leadership roles.

I appreciate the opportunity to have worked with you on shaping the program and offer my continued support moving forward. My peers and I were impacted positively, in many ways, over our eighteen month journey. I look forward to continuing our relationship and working with you and UCF on shaping the MSEM.

Sincerely,

Jim Marshall
Manager, Segment Integrated Facility Planning

Walt Disney World Resort
Lake Buena Vista, Florida
407-939-4724

Dear Dr. Kotnour

The Human Resources Advisory Board at Kennedy Space Center (KSC) is pleased to provide you with KSC's perspective on the proposed name change of the "Master of Science" degree offered by the University of Central Florida (UCF). We understand that the degree content and requirements will remain the same, but the name will be changed to "Master of Science in Engineering Management" (MSEM). We believe that the new MSEM nomenclature more accurately reflects the skills and tools provided by a degree program that is designed to support project managers, advanced program engineers, and technical leads. Accordingly, renaming the "Master of Science" degree as the "Master of Science in Engineering Management" degree would appear to be a very appropriate change.

We appreciate the opportunity to provide KSC's perspective on the development of academic programs for engineers at UCF, and we look forward to continuing to do so in the future.

Miguel A. Rodriguez,
Deputy Director for Management, Engineering and Technology Directorate
Chair, Human Resources Advisory Board
NASA Kennedy Space Center
321-867-7001

Appendix IV
Currently Available Library Holdings

Memorandum

To: Barry Baker, Library Director
Mary Page, Head of Technical Services
Michael Arthur, Head of Acquisitions and Collection Development

From: Ven Basco, Reference Librarian and Collection Development Librarian for Industrial Engineering and Management Systems
Aysegul Kapucu, Reference Librarian and Collection Development Librarian for Electrical Engineering & Computer Engineering

Subject: MS degree in Engineering Management proposal

Date: February 24, 2010

We were asked to work on the library portion of the MS degree program proposal for Engineering Management. Three institutions were selected for comparison with UCF's library holdings. They were:

- University of Florida
- Stevens Institute of Technology
- Missouri University of Science and Technology

The analysis is attached.

Recommendations:

- **Databases:** UCF Libraries have the databases necessary to support the Master's degree program in Engineering Management.

- **Journal titles**: UCF Libraries have the current journals necessary to support the proposed Master's program.

- **Book collection:** UCF compares favorably or better with the other peer institutions in almost all areas. The only area where UCF holdings was significantly lower when compared to another library was in Project Management. University of Florida holds more titles, at least 460 more, under this subject heading. To catch up, UCF needs to purchase at least an additional 100 titles, published in the last 2 years including future publications to keep the collection up-to-date. These books cost $10,312.00 and should be purchased with program monies if the program is approved. (According to the 2010 Library and Book Trade Almanac, the average cost of Engineering and Technology academic books in 2008 was $103.12.)

MS degree in Engineering Management Proposal Library Documentation

Databases

Database Name	**UCF**	**U of F**	**Stevens Institute of Tech.**	**Missouri S & T**
Compendex Web (Ei Village) (1884+)	*	*		*
IEEE Xplore	*	*	*	*
Web of Science (ISI) (1965+)		*		
ABI/INFORM Archive, Dateline, Global, Trade & Industry (ProQuest)	*	*	*	*
Business Source Premier (EBSCOhost)	*	*	*	*
Business & Company Resource Center (Gale) (1980+)	*	*		*
Business Full Text (Wilson) (1913+)		*		
INSPEC (Ei Village 1969+) (FCLA 1970+)	*	*		Archive 1989 – 1968 only
Applied Science & Technology (Wilson) (1913+)	*	*		*
Dissertation and Thesis Full-Text	*	*	Abstracts Only	Abstracts Only

E-Journal Provider	**UCF**	**U of F**	**Stevens Institute of Tech.**	**Missouri S & T**
Emerald	*	*		
Science Direct	*	*	*	*
Taylor & Francis Informaworld	*	*		
SpringerLink	*	*	*	*
Wiley	*	*	*	*
IEEE Xplore	*	*	*	*

Relevant Journals

Journal Title	***UCF***	***U of F***	***Stevens Institute of Tech.***	***Missouri S & T***
Journal of Management in Engineering	*	*	*	*
Leadership and Management in Engineering	*	*	*	*
The Journal of Construction Engineering and Management	*	*	*	*
Cost Engineering		*	*	*
International Journal of Project Management	*	*	*	*
Systems Engineering	*	*	*	*
Project Management Journal	*	*	*	*
The Engineering Economist	*	*	*	*
IEEE Transactions on Engineering Management	*	*	*	*
Engineering Management Review	*	*	*	*
Engineering Management Journal (ASEM)	*	*	*	*
The Engineering Management Journal (IEE IN UK)	*	*	*	*
International Journal of Technology Management	*	*	*	*
Journal of Engineering & Technology Management	*	*	*	*
Journal of High Technology Management Research	*	*	*	*
Journal of Product Innovation Management	*	*	*	*
Technological Forecasting and Social Change	*	*	*	*
Technovation	*	*	*	*
R&D Management	*	*	*	*
Research Policy	*	*	*	*
Research Technology Management	*	*	*	*
Technology Analysis and Strategic Management	*	*	*	*
Academy of Management Review	*	*	*	*
Academy of Management Journal	*	*	*	*
Administrative Science Quarterly	*	*	*	*
California Management Review	*	*	*	*
Decision Analysis	*	*	*	*
Harvard Business Review	*	*	*	*
Information Technology & People	*	*	*	*
Interfaces	*	*	*	*
International Journal of Operations & Production Management	*	*	*	*
International Journal of Quality & Reliability Management	*	*	*	*
International Journal of Service Industry Management	*	*	*	*
Management Decision	*	*	*	*
Management Review	*	*	*	*
Management Science	*	*	*	*
Manufacturing & Service Operations Management	*	*	*	*

National Productivity Review	*	*	*	*
Organization Science: a journal of the Institute of Management Sciences.	*	*	*	*
Sloan Management Review	*	*	*	*
Journal of Engineering Education	*	*	*	*
IEEE Transactions on Education	*	*	*	*

Books

Subject Heading	**UCF**	**U of F**	**Stevens Institute of Tech.**	**Missouri S & T**
Engineering--Management TA190, T56.8, TA174	108	97	33	63
Project Management HD69, TA190	633	1101	258	521
Research, Industrial--Management HD20.5, T175.5	176	186	55	123
Systems Engineering TA165-TA168	381	417	104	371
Portfolio Management	319	325	59	347
Technology--Management	33	21	0	29

Appendix V
2010-11 Graduate Catalog Copy

DESCRIPTION
The Master of Science in Engineering Management (MSEM) degree in the Industrial Engineering focuses on effective decision-making in engineering and technological organizations. This degree is designated a Professional Science Master's (PSM) degree.

International students may only take one course per semester in a totally online format while attending UCF on a F-1 visa. Courses in this program can be taken in mixed mode for international students at UCF or fully online for international students who are not on visas. If you have questions, please consult the International Service Center at www.intl.ucf.edu.

CURRICULUM

Total Credit Hours Required:

30 Credit Hours Minimum beyond the Bachelor's Degree

This program can be taken entirely through the Florida Engineering Educational Delivery System (FEEDS), which provides video-streamed versions of classes over the Internet.

The MSEM degree requires an undergraduate degree in Engineering or a closely related discipline. Students with undergraduate degrees outside of industrial engineering may be required to take additional prerequisite courses. An approved program of study must be developed in consultation with the graduate program director. The total number of hours is 30 hours.

Required IEMS Core Courses (21 credit hours)

- ESI 5219 Engineering Statistics
- EIN 5140 Project Engineering
- ESI 6551C Systems Engineering
- EIN 6357 Advanced Engineering Economic Analysis
- EIN 5108 The Environment of Technical Organizations
- EIN 6459 Concurrent Engineering
- EIN 6182 Engineering Management

Restricted Electives—9 Credit Hours

Select 3 courses from the following courses.

- EIN 5117 Management Information Systems I (3 credit hours)
- EIN 5251 Usability Engineering (3 credit hours)
- EIN 6339 Operations Engineering (3 credit hours)
- EIN 6224 Quality Management (3 credit hours)
- ESI 6358 Decision Analysis (3 credit hours)
- EIN 6528 Simulation-based Life Cycle Engineering (3 credit hours)
- EIN 5356 Cost Engineering (3 credit hours)
- EIN 6326 Technology Strategy (3 credit hours)
- EIN 6936 Seminar in Advanced Industrial Engineering (3 credit hours)
- EIN 6935 Special Topics (e.g., Technical Communication) (3 credit hours)

At least one-half of the credit hours of all courses (including thesis hours) in a master's program of study must be at the 6000 level or higher. Students on assistantships must take 9 credit hours per semester to

satisfy the university's requirement for full-time status. Most students working full time take 6 credit hours per semester. At that rate, the program can be completed in 6 semesters or less. However, students with more time available and with an early start on a thesis, if applicable, can finish the program in 3 semesters.

Comprehensive Examination
Non-thesis students must successfully pass an oral comprehensive examination to fulfill degree requirements. Please see the program director for further details.

Equipment Fee
Students in the Industrial Engineering MS program pay a $90 equipment fee each semester that they are enrolled. For part-time students, the equipment fee is $45 per semester.

Application Requirements
For information on general UCF graduate admissions requirements that apply to all prospective students, please visit the Admissions section of the Graduate Catalog. Applicants must apply online. All requested materials must be submitted by the established deadline.
The College of Engineering and Computer Science encourages prospective applicants to complete a pre-application form (www.cecs.ucf.edu/preapp) before completing the online application for graduate admission.
In addition to the general UCF graduate application requirements, applicants to this program must provide:

- One official transcript (in a sealed envelope) from each college/university attended.
- A bachelor's degree in Engineering or a closely related discipline.
- Two letters of recommendation.
- Résumé.
- Statement of educational, research, and professional career objectives.

Faculty members may choose to conduct face-to-face or telephone interviews before accepting an applicant into their research program.

Application Deadlines

FINANCIALS
Graduate students may receive financial assistance through fellowships, assistantships, tuition support, or loans. For more information, see Student Finances, which describes the types of financial assistance available at UCF and provides general guidance in planning your graduate finances. The Financial Information section of the Graduate Catalog is another key resource.

Fellowships
Fellowships are awarded based on academic merit to highly qualified students. They are paid to students through the Office of Student Financial Assistance, based on instructions provided by the College of Graduate Studies. Fellowships are given to support a student's graduate study and do not have a work obligation. For more information, see Fellowships, which includes descriptions of UCF fellowships and what you should do to be considered for a fellowship.

Appendix VI
Correspondence with State Programs

Given below is the letter the IEMS chair sent to Florida schools about the degree.

Dear "chair"

I am writing to inform you that our department is establishing a MSEM degree. As part of the new process with the Board of Governors we need to inform other programs in the state that have a similar program.

The Engineering Management program at UCF has been in existence since the early 1990s. The program is being offered as a track in the Master of Science degree within the Industrial Engineering & Management Systems Department.

Our current effort is focused on moving the program from a track designation to a Master of Science in Engineering Management. We will also designate the degree as a "Professional Science Masters" degree. The curriculum focuses on giving engineers the skills lead and manage project teams and engineering teams. The courses will focus on:

- Project management
- Technology management
- Quantitative decision modeling and making
- Systems engineering.

Given the program has been offered since the early 1990s, we do not foresee creating any additional overlaps with your program. We are merely formalizing the degree.

We welcome opportunities to partner with you in the future. Please let me know if you would like to partner with us on research and teaching activities.

Best wishes, Waldemar

_____

Dr. Waldemar Karwowski, Professor and Chair
Department of Industrial Engineering and Management Systems
Executive Director, Institute for Advanced Systems Engineering
University of Central Florida
4000 Central Florida Blvd.
P.O. Box 162993
Orlando, FL 32816-2993
USA
Tel +1 407 823 2204
Fax +1 407 823 3413
http://www.iems.ucf.edu

Given below are the responses from the Chairs of the programs.

School	Program	Summary of Feedback
Florida A&M University	MSIE Management Program	
Florida Atlantic University	Graduate Minor in Engineering Management in Dept of Ocean and Mechanical Engineering	
Florida Gulf Coast University	Not applicable	Not applicable
Florida International University	MS Engineering Management	Dear Waldemar, Thank you very much for the information. We are interested in learning more about your program, and are more than happy to partner with you on research and teaching activities. Chin-Sheng Chen. Ph.D. Professor and Engineering Management Program Director College of Engineering & Computing Florida International University 10555 W Flagler Street, EC 3110 Miami, FL 33174
Florida State University	MSIE Management Program	
University of Florida	Outreach EM—Master of Science	**From:** Hartman,Joseph C [mailto:jchartman@ufl.edu] **Sent:** Wednesday, March 23, 2011 4:03 PM **To:** Waldemar Karwowski **Cc:** Geunes, Joseph **Subject:** Re: Informatin about establishing a MSEM degree program at UCF Thank you for the information Waldemar. See you in Reno! Sincerely, Joe
University of North Florida	Not applicable	Not applicable
University of South Florida	MS in EM	
University of West Florida	Not applicable	Not applicable

Appendix VII Detailed Budget Information

Summary Analysis

Name of Program:	Professional Master of Science in Engineering Management
Level of program:	Masters
CIP code:	
Author:	

					Additional resources needed for new program			
Estimated Costs	Total	Current	Reallocation		New E&G	C&G	Cost/fte*	Cost/fte**
Year 1	$471,303	$196,871	$196,871	42%	$5,312	$269,120	$14,530	$ 6,233
Year 2	$519,919	$221,480	$221,480	43%	$5,000	$293,439	$13,331	$ 5,807
Year 3	$689,465	$256,222	$256,222	37%	$0	$433,243	$14,116	$ 5,246
Year 4	$551,335	$244,641	$244,641	44%	$0	$306,694	$10,577	$ 4,693
Year 5	$643,077	$244,641	$244,641	38%	$0	$398,436	$10,147	$ 3,860

* based upon total costs

** based upon current and new costs only, does not include C&G

FTE/Headcount

	Year 1	Year 2	Year 3	Year 4	Year 5
Headcount	50	60	75	80	100
FTE	32.44	39.00	48.84	52.13	63.38

Criteria for Program Approval (8 criteria)

Met with Strength	Met	Met with Weakness	Unmet
		0	0

Estimated GROSS revenue generated through student enrollment

Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	
Orlando campus	$184,496	$195,272	$195,272	$195,272	$559,419	On-campus gross tuition revenue
Cohorts	$614,938	$665,203	$992,141	$706,406	$902,938	Cohort gross tuition revenue
Total GROSS	$799,434	$860,475	$1,187,412	$901,678	$1,462,356	

Estimated revenue generated through student enrollment - College

Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	
Orlando campus	$0	$119,923	$126,927	$126,927	$126,927	SCH revenue generated from on-campus tution
Cohorts	$10,800	$18,247	$10,800	$18,247	$19,923	33% Cohort net revenue
	$0	$78,446	$98,057	$134,829	$147,086	70% SCH revenue generated from cohort tuition
	$122,304	$131,712	$197,568	$141,120	$178,752	faculty salary and fringe recovery
Total GROSS	$133,104	$348,327	$433,352	$421,122	$472,688	
Total NET	-$69,079	$121,847	$177,130	$176,481	$228,047	GROSS minus College costs from above

Estimated NET revenue generated through student enrollment - Other

Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	
Indus Engr Dept	$10,800	$18,247	$10,800	$18,247	$19,923	33% Cohort net revenue
ELII	$10,800	$18,247	$10,800	$18,247	$19,923	33% Cohort net revenue
RC 30% SCH	$0	$33,620	$42,025	$57,784	$63,037	30% SCH revenue generated from cohort tuition
CE 8% overhd	$36,858	$76,800	$36,858	$76,800	$75,258	
UCF Aux ovrhd	$25,619	$54,932	$25,619	$54,932	$53,085	

TABLE 2

PROJECTED COSTS AND FUNDING SOURCES

Instruction & Research Costs (non-cumulative)	Year 2 Funding Source					Year 3 Funding Source					Year 4 Funding Source				
	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Subtotal E&G and C&G	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Subtotal E&G and C&G	Continuing Base** (E&G)	New Enrollment Growth (E&G)	Other*** (E&G)	Contracts & Grants (C&G)	Subtotal E&G and C&G
Faculty Salaries and Benefits	$221,480	$0	$0	$0	$221,480	$256,222	$0	$0	$0	$256,222	$244,641	$0	$0	$0	$244,641
A&P Salaries and Benefits	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
USPS Salaries and Benefits	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Personnel Services	$0	$0	$0	$115,500	$115,500	$0	$0	$0	$173,250	$173,250	$0	$0	$0	$123,750	$123,750
Assistantships and Fellowships	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Library	$0	$5,000	$0	$0	$5,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Expenses	$0	$0	$0	$177,939	$177,939	$0	$0	$0	$259,993	$259,993	$0	$0	$0	$182,944	$182,944
Operating Capital Outlay	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Special Categories	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Costs	$221,480	$5,000	$0	$293,439	$519,919	$256,222	$0	$0	$433,243	$689,465	$244,641	$0	$0	$306,694	$551,335

*Identify reallocation sources in Table 3.

**Includes recurring E&G funded costs ("reallocated base", "enrollment growth", and "other new recurring") from Years 1-4 that continue into Year 5.

***Identify if non-recurring

IDENTIFICATION OF CURRENT BASE FUNDS TO SUPPORT THE NEW PROGRAM

NAME OF PROGRAM__ Professional Master of Science in Engineering Management

PROGRAM LEVEL__ Masters

CIP IDENTIFICATION__

DATE SUBMITTED__ Spring 2011

	FIRST YEAR					SECOND YEAR				
		New from Enrollment	New from New	New from Non-	New from		New from Enrollment	New from New	New from Non-	New from
	Reallocated BASE RESOURCES	Growth NEW PROGRAMS	Recurring E&G REVENUE	Recurring E&G REVENUE	C&G REVENUE	Reallocated BASE RESOURCES	Growth NEW PROGRAMS	Recurring E&G REVENUE	Recurring E&G REVENUE	C&G REVENUE
POSITIONS (in FTE):										
FACULTY	1.36	0.00	0.00	0.00	0.00	1.53	0.00	0.00	0.00	0.00
A&P		0	0				0	0		
USPS		0					0			
TOTAL	1.36	0.00	0.00	0.00	0.00	1.53	0.00	0.00	0.00	0.00
A&P	0	USPS	0			A&P	0	USPS	0	
SALARY RATE:										
FACULTY	153806	0	0	0	0	173031	0	0	0	0
A&P		0	0				0	0		
USPS		0								
TOTAL	153806	0	0	0	0	173031	0	0	0	0
Faculty Salaries and Benefits	196871	0	0	0	0	221480	0	0	0	0
A&P Salary and Benefits	0	0	0	0	0	0		0	0	0
USPS Salary and Benefits	0	0	0	0	0	0	0	0	0	0
Other Personnel Services	0				107250					115500
Assistantships and Fellowships					0					0
Library		5312					5000			
Expenses	0	0			161870	0				177939
Operating Captal Outlay										
Special Categories										
TOTAL	196871	5312	0	0	269120	221480	5000	0	0	293439

	THIRD YEAR					FOURTH YEAR					FIFTH YEAR			
		New from Enrollment	New from New	New from Non-	New from		New from Enrollment	New from New	New from Non-	New from		New Enrollment		
	Reallocated	Growth	Recurring	Recurring		Reallocated	Growth	Recurring	Recurring		Continuing	Growth	Other	C&G
	BASE	NEW	E&G	E&G	C&G	BASE	NEW	E&G	E&G	C&G	BASE	E&G	(E&G)	NEW
	RESOURCES	PROGRAMS	REVENUE	REVENUE	REVENUE	RESOURCES	PROGRAMS	REVENUE	REVENUE	REVENUE	RESOURCES	PROGRAMS	REVENUE	REVENUE
POSITIONS (in FTE)														
FACULTY	1.77	0.00	0.0	0.00	0.00	1.69	0.00	0.00	0.00	0.00	1.69	0.00	0.00	0.00
A&P		0					0	0				0	0	
USPS														
TOTAL	1.77	0.00	0.0	0.00	0.00	1.69	0.00	0.00	0.00	0.00	1.69	0.00	0.00	0.00
A&P	A&P	0	USPS	0		A&P	0	USPS	0		A&P	0	USPS	0
SALARY RATE:														
FACULTY	20017	0		0	0	191126	0	0	0	0	191126	0	0	0
A&P		0					0	0				0	0	
USPS		0					0					0		
TOTAL	20017	0		0	0	191126	0	0	0	0	191126	0	0	0
Faculty Salaries and Benefits	25622	0		0	0	244641	0	0	0	0	244641	0	0	0
A&P Salary and Benefits	0			0	0	0		0	0	0	0		0	0
USPS Salary and Benefits	0	0		0	0	0	0	0	0	0	0	0	0	0
Other Personnel Services		0			173250					123750				156750
Assistantships and Fellowships					0					0				0
Library							0					0		
Expenses	0				259993	0				182944	0			241686
Operating Capital Outlay														
Special Categories														
TOTAL	25622	0		0	433243	244641	0	0	0	306694	244641	0	0	398436

TABLE 4

ANTICIPATED FACULTY PARTICIPATION - Combined

Faculty Code	Faculty Name or "New Hire" Highest Degree Held Academic Discipline or Speciality	Rank	Contract Status	Initial Date for Participation in the Program	Mos. Contract Year 2	FTE Year 2	% Effort for Prg. Year 2	PY Year 2	Mos. Contract Year 3	FTE Year 3	% Effort for Prg. Year 3	PY Year 3	Mos. Contract Year 4	FTE Year 4	% Effort for Prg. Year 4	PY Year 4
A	Robert Hoekstra	Associate Prof	tenured	2011	9	0.75	55%	0.41	9	0.75	55%	0.41	9	0.75	66%	0.50
A	Bill Thompson	Associate Prof	not tenued	2011	9	0.75	11%	0.08	9	0.75	11%	0.08	9	0.75	11%	0.08
A	Mark Calabrese	Instructor	not tenued	2011	9	0.75	33%	0.25	9	0.75	33%	0.25	9	0.75	33%	0.25
A	Serge Sala-Diakanda	Assistant Prof	visiting	2011	9	0.75	11%	0.08	9	0.75	11%	0.08	9	0.75	11%	0.08
A	Kent Williams	Associate Prof	tenured	2011	9	0.75	17%	0.12	9	0.75	17%	0.12	9	0.75	17%	0.12
A	Dima Nazzal	Assistant Prof	tenure- track	2011	9	0.75	11%	0.08	9	0.75	22%	0.17	9	0.75	22%	0.17
A	Timothy Kotnour	Prof	tenured	2011	9	0.75	55%	0.41	9	0.75	55%	0.41	9	0.75	55%	0.41
A	Mansooreh Mollaghasemi	Associate Prof	tenured	2011	9	0.75	11%	0.08	9	0.75	33%	0.25	9	0.75	11%	0.08
	Total Person-Years (PY)							1.53				1.77				1.69

Appendix VIII Flowchart of Revenue

Given below is an example flow of the dollars in the cohort-based program. This flow assumes growth in overall student credit hours and allocation of additional tuition dollars to both Regional Campuses and CECS from the PEMP delivery of the MSEM (i.e., return of 65% of SCH revenue)..

	Total	UCF	RC/DCE	CECS	IEMS	PEMP
Program Fees	$30,000					
Tuition	$8,900	$3,100	$1,800	$4,000		
OH & Administration	$4,100	$1,700	$2,400			
Program Expenses	$8,200					$8,200
UCF Faculty to Deliver	$5,800			$5,800		
Balance Distribution	$3,000			$1,000	$1,000	$1,000
Total Distribution (without Program Expenses)	$21,800	$4,800	$4,200	$10,800	$1,000	$1,000

Appendix IX References

Beer, M., & Nohria, N. (2000). Cracking the Code of Change. *Harvard Business Review, 78*(3), 133-139.

Kotnour T. and Landaeta R., (2007) "Extending the Cooperative Learning Principles to Multiple Learning Groups & Timeframes: A Case Example," *Journal of Faculty Development*, Vol.21, No.3, pp. 201-216.

Scott, G.M. (1998). The new age of new product development: Are we there yet?, *R & D Management*, 28:4.

Analysis Summary for New Degree Authorization
M.S. Engineering Management

	Criteria	Proposal Response to Criteria
1.	The goals of the program are aligned with the university's mission and relate to specific institutional strengths.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____
2.	If there have been program reviews or accreditation activities in the discipline or related disciplines pertinent to the proposed program, the proposal provides evidence that progress has been made in implementing the recommendations from those reviews.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____
3.	The proposal describes an appropriate and sequenced course of study. Admissions and graduation criteria are clearly specified and appropriate. The course of study and credit hours required may be satisfied within a reasonable time to degree. In cases in which accreditation is available for existing bachelor's or master's level programs, evidence is provided that the programs are accredited or a rationale is provided as to the lack of accreditation.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____
4.	Evidence is provided that a critical mass of faculty members is available to initiate the program based on estimated enrollments, and that, if appropriate, there is a commitment to hire additional faculty members in later years, based on estimated enrollments. For doctoral programs, evidence is provided that the faculty members in aggregate have the necessary experience and research activity to sustain a doctoral program.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____
5.	Evidence is provided that the necessary library volumes and serials; classroom, teaching laboratory, research laboratory, office, and any other type of physical space; equipment; appropriate fellowships, scholarships, and graduate assistantships; and appropriate clinical and internship sites are sufficient to initiate the program.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____

	Criteria	Proposal Response to Criteria
6.	Evidence is provided that there is a need for more people to be educated in this program at this level. For all degree programs, if the program duplicates other degree programs in Florida, a convincing rationale for doing so is provided. The proposal contains realistic estimates of headcount and FTE students who will major in the proposed program and indicates steps to be taken to achieve a diverse student body.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____
7.	The proposal provides a complete and realistic budget for the program, which reflects the text of the proposal, is comparable to the budgets of similar programs, and provides evidence that, in the event that resources within the institution are redirected to support the new program, such a redirection will not have a negative impact on undergraduate education. The proposal demonstrates a judicious use of resources and provides a convincing argument that the output of the program justifies the investment.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____
8.	The proposal provides evidence that the academic unit(s) associated with this new degree have been productive in teaching, research, and service.	Met with Strength ____ Met ____ Met with Weakness ____ Unmet ____