Engineering Faculty Council

Meeting Agenda

November 18, 2014
11:00 a.m.
228 Hammond – Aerospace Conference Room

1. Approval of minutes for the meeting of October 21, 2014

2. Updates from Undergraduate Studies Committee (Chris Giebink)

3. Updates from Graduate Studies Committees (Wang-Chien Lee)

4. Updates from Engineering Technology Committee (Ron Land/Terry Speicher)

5. Updates from Faculty Senate (Peter Butler)

6. Dean's Report – Catherine Harmonosky

7. Other Business

ENGINEERING FACULTY COUNCIL

Meeting Minutes- October 21, 2014
202 Hammond

Ronald Land, Terry Speicher, Howard Salis, Chris Giebink, Siyang Zheng, Sven Schmitz, Aly Salid, Runkun (Justin) Jiang, Wang-Chien Lee, Catherine Harmonosky, Anthony Atchley, Blaine Prichard (in for Rachel Fore)

1. Approval of minutes for the meeting of September 16, 2014

   Minutes posted on ANGEL. Approved unanimously.

2. Updates from Undergraduate Studies Committee (Chris Giebink)

   In general these are minor changes. EFC member comments on the fact that experimental courses should be taught for maximal three times. There is no minimal requirement. All courses are approved unanimously.

3. Updates from Graduate Studies Committees (Wang-Chien Lee)

   <u>10 course change proposals</u>: 8 voted for approval including 2 requiring feedback, 2 returned. GS&R report is approved unanimously.

   The approval procedure needs to be clarified in the EFC Bylaws, which will be discussed in future EFC meeting.

   <u>Program change proposals</u>:

   IE MS non-thesis: returned to clarify the difference between the 1 year non-thesis MS program and the current MEng program. In general, the current recommendation leaves the distinction of MS thesis, MS non-thesis, and MEng program to each individual department.

4. Updates from Engineering Technology Committee (Ron Land/Terry Speicher)

   No Changes, nothing to report.

5. Updates from Faculty Senate (Peter Butler)

   Dr. Butler will update next time.

6. Dean's Report – Catherine Harmonosky

   1) Updates on building: There was a meeting last week with department heads. New engineering building was proposed to be built at the current parking lot for student co-laboratory, i.e. labs for students from different departments. $40M request from the State will be submitted in addition to funding from University

and COE ($3M in donations). ChE/BME building is moving forward. The current ChE building will be demolished. The total budget is $150M.

2) *ABET: There were no deficiencies, 11 weaknesses, 20 concerns. Corrections of the weaknesses and concerns need to be made before the final vote in July. The draft report will be due in December. Final report will be in August and we will be accredited for 6 years. Three is a new general engineering program offered at three commonwealth campuses: DuBois (applied materials), Philadelphia area (multidisciplinary engineering design), Hazleton (alternative energy and power generation). The first review for this program has just two concerns.*

3) *Dean Elnashai asks EFC to discuss the structure of the pre- and post- awards. Recommendations are needed. We have a new associated Dean for research and innovation, Dr. Theresa Mayer. Pre-awards may include proposal development, submission, and administration. Post-awards may include both financial and non-financial aspects. The pressure points, blocks and clogs need to be identified. The EFC will send an email to its members, and comments will be gathered for the next EFC meeting.*

4) *One year MS degree is important for the immediate future of the college. The EFC is expected to work efficiently on related issues. Do we need to define a MS thesis (MS thesis), MS scholarly paper (MS non-thesis), and experience (MEng)? One factor can be considered is the educational outcomes. It might be better to leave this to each department. Currently the distinctions are left to each individual department. EFC may provide some guidelines. Maybe we can check other institute for the similar situations (e.g. UIUC IE program established by Elnashai).*

7. Other Business

   Nothing to report.

8. Update on EFC Website

   New template for EFC website is available. Please forward comments, subcommittee members to Sven.

Undergraduate Studies Curricular Review Committee
Summary Report from October 29, 2014 meeting for
Engineering Faculty Council Meeting November 18, 2014

Course Proposal Changes	Type and Description of Change	Description or Rationale for Curricular Actions
Residential Construction Minor Submitted by: Ali Memari	***NEW*** Minor submitted by A E Department	The objective of the Residential Construction Minor is to provide an opportunity for students to gain an understanding of the residential building construction topics and issues with emphasis on sustainable land development, design and construction of residential buildings, as well as construction management of residential projects. Residential building construction is a unique interdisciplinary field that draws upon civil and architectural engineering, architecture, real estate, management, finance, and marketing disciplines, and design principles including economical, safe, and serviceable structural design, green building systems design, sustainable land development, and construction management. This minor is expected to be primarily of interest to students from Civil and Environmental Engineering, Architectural Engineering, and Architecture majors, but students from other majors can also enroll in this minor. This minor will help students to increase their competitiveness for employment in residential market and construction industry.
ENGR 295A – Engineering Cooperative Education Submitted by: Christine Masters & Kimberly Fox	***CHANGE*** – Modification of Description	The course description of this course is being changed to more accurately describe the courses and terminology used for the required course assignments. Note that co-op credit usage, course grading, pre-requisites, and the number of credits awarded for each course will not change.
ENGR 295I - Engineering International Cooperative Education Submitted by: Christine Masters & Kimberly Fox	***CHANGE*** – Modification of Description	The course description of this course is being changed to more accurately describe the courses and terminology used for the required course assignments. Note that co-op credit usage, course grading, pre-requisites, and the number of credits awarded for each course will not change.
ENGR 395A – Engineering Cooperative Education Submitted by: Christine Masters & Kimberly Fox	***CHANGE*** – Modification of Description	The course description of this course is being changed to more accurately describe the courses and terminology used for the required course assignments. Note that co-op credit usage, course grading, pre-requisites, and the number of credits awarded for each course will not change.
ENGR 395I - Engineering International Cooperative Education Submitted by: Christine Masters & Kimberly Fox	***CHANGE*** – Modification of Description	The course description of this course is being changed to more accurately describe the courses and terminology used for the required course assignments. Note that co-op credit usage, course grading, pre-requisites, and the number of credits awarded for each course will not change.

ENGR 495A – Engineering Cooperative Education Submitted by: Christine Masters & Kimberly Fox	***CHANGE*** – Modification of Description	The course description of this course is being changed to more accurately describe the courses and terminology used for the required course assignments. Note that co-op credit usage, course grading, pre-requisites, and the number of credits awarded for each course will not change. On rare occasions students will have the opportunity for more than 3 work rotations in their co-op assignments. ENGR 495 is being changed to a repeatable course to correct the course description to match this practice.
ENGR 495I - Engineering International Cooperative Education Submitted by: Christine Masters & Kimberly Fox	***CHANGE*** – Modification of Description	The course description of this course is being changed to more accurately describe the courses and terminology used for the required course assignments. Note that co-op credit usage, course grading, pre-requisites, and the number of credits awarded for each course will not change. On rare occasions students will have the opportunity for more than 3 work rotations in their co-op assignments. ENGR 495 is being changed to a repeatable course to correct the course description to match this practice.

EFC Proposal Report

-Recommendation of Proposal Actions from the GS&R Committee
for EFC Meeting - 11/18/2014

Course and Program Proposals

Type Course or Program	Title	Program Name	Number or Degree	Action Requested	Vote GS&R	Description (Why/What for)	Summary of Discussion Points (non-Unanimous Only)
Course	Fundamentals of Acoustics I	ACS	501	Change	Approve - U	The justification for changing this course is to increase the credit from 2 units to 3 units. An internal curriculum review found that course content in this fundamental course needed to be expanded and reorganized and the student workload increased to ensure students were being adequately prepared for success in subsequent courses and to provide better preparation for students taking the Acoustics Ph.D. candidacy exam.	
Course	Fundamentals of Acoustics II	ACS	502	Change	Approve - U	The justification for changing this course is to increase the credit from 2 units to 3 units. An internal curriculum review found that course content in this course needed to be expanded and reorganized.	
Course	Software & Hardware Project Management	C SE	820	Add	Approve - U	This course provides a broad exploration of the field of software, hardware, and integrated software/hardware project management. In particular, it investigates the fundamentals of risk, scope, time and cost management, quality assurance, scheduling, and human resource functions. It considers the nuances of software, hardware, and integrated hardware/software project management, as distinct from the management of projects in, say, building construction or manufacturing. Building on these insights, the student will learn how to apply these techniques to a real-world project of his or her choosing. Students will learn to recognize, identify, and apply the functions of project management to the types of projects which they will encounter in industry. This course supports the professional nature of the MEng degree.	
Course	Neural Engineering: Fundamentals of Interfacing with Brain	ESC	525	Add	Approve - U	The brain is one of the most complex systems about which we know. Exciting advances have been made in methodologies for detecting neural signals, modeling neural dynamics, and constructing bidirectional interfaces for prosthetic applications such as restoring sensory input, providing neural control of devices, and controlling disease states. E SC 525 will provide an overview of the field of neural engineering with a focus on the fundamentals of neural interfaces and their applications. The course objectives are to describe the biophysical basis of neural function, the origin of measurable signals, electrical interactions used for neural stimulation, and the fundamentals of hardware-brain interfaces. Special attention will be given to the electrochemical nature of the electrode tissue interface. E SC 525 will be of interest in students wanting to work in the diverse fields contributing to the development and applications of neural interfaces and devices, including those interested in device, materials, and control systems development, electronics, and clinical research, as well as those interested in measuring and modeling neural processing and behavior.	
Course	Brain Computer Interfaces (BCI)	E SC	527	Add	Approve - U	Mind reading video games headsets? Extensive advances have been made within the last decade to translate measur ements of brain activity for prosthetic output. E SC 527, targets engineering and science students, and will introduce this field through hands-on experiments and design projects. We will cover an introduction to electroencephalogram (EEG) recording and interpretation, applied signal processing, discrimination and classification, and control programming. Students will apply these tools to implement their own BCI projects. This is a laboratory class, with groups of students working to record and analyze each other's EEG and create real-time analysis tools.	

Type Course or Program	Title	Program Name	Number or Degree	Action Requested	Vote GS&R	Description (Why/What for)	Summary of Discussion Points (non-Unanimous Only)
Course	Structural Health Monitoring	E MCH	541	Add	Approve - U	Structural Health Monitoring (SHM) is the monitoring of the condition of a structure or system using autonomous sensory systems and any intervention to preserve structural integrity. It is nondestructive evaluation with a sensory system that stays in place and enables condition-based maintenance. SHM is a broad multidisciplinary field both in terms of the diverse science and technology involved as well as in its varied applications. However, at its essence are three fundamental elements: sensing, data analysis, and decision making. The technological developments necessary to enable practical structural health monitoring are originating from scientists and engineers in many fields including physics, chemistry, materials science, biology, and mechanical, aerospace, civil, and electrical engineering. SHM is being implemented on diverse systems and structures such as aircraft, spacecraft, ships, helicopters, automobiles, bridges, buildings, civil infrastructure, power generating plants, pipelines, electronic systems, manufacturing and processing facilities, biological systems, and employed for the protection of the environment and for defense. The objectives of SHM are to: improve public safety, reduce maintenance costs, improve readiness, and foster a paradigm shift in design. Upon successful completion of this course, students will have the skills necessary to: 1) characterize material and structural degradation modes based on loading and environment; 2) describe and compare various types of diagnostics for aerospace, civil, and mechanical applications; 3) select a viable SHM methodology for a given application based on available technology; 4) apply the mechanics of guided waves for SHM applications to detect structural defects; and, 5) apply fundamentals of prognostic modeling to predict remaining fatigue life. This course will prepare students to work in the multi-disciplinary field of structural health monitoring by teaching fundamental concepts of material damage and modeling, sensing technologies, and diagnostics and prognostics methods as applied to aerospace, civil, and mechanical structures and systems.	
Course	Physical Principles in Biomedical Ultrasonics	E MCH	542	Add	Approve - U	This course focuses on the phenomenon of ultrasound in the context of medical and biological applications, systematically discussing physical principles and concepts. Concepts of wave acoustics are examined and practical implications are explored - first, the generation and nature of acoustic fields and then their formal descriptions and measurement. Real tissues attenuate and scatter ultrasound in ways that have interesting relationships to their physical chemistry, and the course includes coverage of these topics. This course also includes critical accounts and discussions of the wide variety of diagnostic and investigative applications of ultrasound that are available in medicine and biology. The course encompasses the biophysics of ultrasound and its practical applications to therapeutic and surgical objectives. The course utilizes finite element methods for simulation.	
Course	Micro-and Nano-Optoelectronic Devices and Applications	E SC	583	Add	Approve - U	The objective of this course is to provide the engineering graduate student with a unifying and multifaceted description on the new and exciting area of micro- and nanophotonic devices. Students will learn the fundamental principles behind many novel micro- and nanophotonic devices as well as their practical applications in the fields of communication, sensor, imaging and lighting technology. One feature of the course is that it is structured to include the background knowledge discussions that are necessary for a broad range of topics so that a student with minimal perquisites will be able to acquire the useful information from the class. This course is aimed to stimulate the interest of engineering students and enable them to marry the knowledge with inspirations, creating the visions that are needed for the future scientists and engineers. It also provides those non-engineering, such as biology, chemistry, and materials, graduate students with an opportunity to acquire an introductory understanding on many micro and nano-optoelectronic devices that are applied in their research studies. The course starts with an overview on the fundamental physics of semiconductors with emphases on silicon, III-V and II-V compound semiconductors due to their important applications in MOEMS and active nanoptoelectronic devices. Semiconductor nanostructures, such as epitaxial grown quantum wells and quantum dots, and chemically synthesized nanowires and colloidal nanocrystals will be introduced through discussions on their unique electronic structures, carrier transport and excitonic dynamics. In addition to inorganic materials, the structures and critical characteristics of electro-optic and light emitting polymers will also be reviewed for their fast-growing applications in display technology, sensory and information processing systems. The general principles for the design and operation of micro- and nanophotonic devices will be discussed in the frame of geometrical optics, electromagnetic theory, and semiconductor physics. The reflection of light at dielectric interfaces will be reviewed to reveal the critical features of optical waveguide structures and to introduce the concept of surface plasma waves. In-depth description will be given for the interband- and intraband- electron transition and exciton emission process in semiconductor quantum structures. Important instances of applying the “quantum confinement” in nanostructures to tailor their optical and optoelectronic properties will be underscored during the mechanism-analysis of laser diodes, detectors and modulators. The new concept of “photonic crystals” will be introduced through the analysis of parallelism between electron transport in semiconductor lattices and light propagation in periodic dielectric media. Following a brief survey on the state-of-the-art technologies for the fabrication of micro- and nanophotonic devices, the course topics will move to their application examples in the fields of communication, sensor and imaging technology. For each application example, analysis will be carried out on the design, fabrication, and characterization issues of the involved systems/devices. Their merit-of-performance will be linked to the application practice to illustrate how the introduction of micro/nanophotonic devices advances the technology in each specific field. Important topics to be covered in this part include micromachined lightwave systems, microcavity light emitting devices, fiber based biological nanosensors,	

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Course	Manufacturing Processes and Materials	IE	560	Add	Approve - U	The course provides a broad exploration of the manufacturability of engineering materials. In particular it investigates the fundamentals of material performance during processing, manufacturability requirements for primary material processing methods, and the processing limitations of widely used material systems. It considers formability, machinability, castability, weldability and, particulate consolidation of metallic systems with emphasis on widely used ferrous and non-ferrous alloys. Building upon these insights, students will develop an integrated understanding of material processing science and control, and microstructure/property/processing relationships. They will be able to select appropriate material and manufacturing processes for engineering components and identify critical material and manufacturability issues that limit manufacturing success. Students will be able to apply these principles to develop an understanding of manufacturability constraints for newly developed engineering materials and processing methods. The course is an elective course for all Industrial Engineering MS, MENG and PhD degrees and is part of the required core of courses for the MS and MENG Manufacturing Option.	
Program	Proposal to add a non-thesis track to the current Master of Science degree in Chemical Engineering	CH E	MS Non-Thesis	Change	Approved - U	With the huge upswing in computer science and engineering (CSE) undergraduate students, there is and will be a concomitant increase in the demand for graduate programs in computer science and engineering. In addition, with the speed of change of the computer science and engineering field and the lack of support at the high school level, it's increasingly difficult to fully educate students within the confines of an undergraduate degree. Thus, the demand for master's degrees in computer science and engineering is expecting to continue to rise. According to the Bureau of Labor Statistics, occupations that require a master's degree are projected to grow the fastest between now and 2022. According to Forbes, a master's degree in computer science ties for first place with physician's assistant in occupational potential of graduate studies. Penn State currently receives around 1000 applications for their graduate program in computer science and engineering. The societal demand for a graduate degree in CSE is huge. It is part of the mission of the University and the College of Engineering to respond to societal needs,. We see expanding the availability of master's level computer science and engineering programs as an important aspect of the department's future. However, maintaining quality while handling a large influx of students is a major challenge. This program includes a plan to enable the department to offer and manage a high-quality program that meets the needs of the students, employers, and society at large. Enrollments for this program are expected to capped at fifty students per cohort, although an initial cohort of fifteen to twenty students will be enrolled during the first year. Students will initially be drawn from the existing pool of applications, being invited into the program on competitive basis if they have not been selected for a PhD or MS program. Since the existing MEng program is underutilized, the addition of this program will not affect enrollments of any existing program. Students must start in the fall term and continue with their cohort, finishing in the summer. Students who do not make sufficient progress in the program will not be allowed to continue to the next semester.	
Program	Proposal to Add A Non-Thesis Track to the Current Master of Science Degree in Industrial Engineering and Drop the Master of Engineering Degree In Industrial Engineering	IE	MS Non-Thesis	Change /Drop	Approved - U	The current MS degree with thesis track requires a total of 32 credits consisting of 24 credits of coursework, two credits of colloquium and six credits of research/thesis. The current MENG degree requires a total of 30 credits consisting of 27 credits of coursework, one credit of colloquium and two credits of research/paper. Most of the students seeking the MENG degree complete this within three semesters (Fall, Spring and Fall semesters). On the other hand, most of the students seeking the current MS degree with thesis track take four semesters to complete this degree. The main reason for this is the time required to complete six credits of research and the resulting thesis. In spite of this, most of the Masters students in the department seek the MS degree. Out of the 177 graduate students in the department in Spring 2014, 89 students are seeking their Master's degree out of which 59 students (66%) are MS. Students and only 30 (33%) are MENG students. It is obvious that the MS degree is sought out by most students over the MENG degree. The proposed MS degree with non-thesis track will require a total of 32 credits consisting of 27 credits of coursework, two credits of colloquium and three credits of research/paper. This proposed MS degree with non-thesis track will help the students who seek the MS degree, by shortening the required time to complete the degree within 12 months – Fall, Spring and Summer. We want to eliminate the current Master of Engineering degree, because the proposed MS degree in Industrial Engineering will make our graduates most competitive in their job search. As pointed out earlier, most of the current students seeking masters degree in the department prefer the current MS degree with thesis track. Hence, we expect that the demand for the current MENG degree will decrease, after we start offering the MS degree with non-thesis track. It is optimal for our department to allocate more resources to the MS degree with non-thesis track, rather than to the MENG degree. Also, the credit requirements for the current MENG degree and the proposed MS degree with non-thesis track are very similar. The proposed MS degree with non-thesis track will also help the students working in industry to obtain their MS degree in Industrial Engineering in an easier way as compared to the current MS degree with thesis track. We expect the enrollment of students seeking the Master's degree to go up to 100 per year, out of which most students (at least 70) will seek the proposed MS degree with non-thesis track.	

Type Course or Program	Title	Program Name	Number or Degree	Action Requested	Vote GS&R	Description (Why/What for)	Summary of Discussion Points (non-Unanimous Only)
Program	Proposal for changes to existing MEng program	CSE	M Eng Non Thesis	Change	Approve - U	With the huge upswing in computer science and engineering (CSE) undergraduate students, there is and will be a concomitant increase in the demand for graduate programs in computer science and engineering. In addition, with the speed of change of the computer science and engineering field and the lack of support at the high school level, it's increasingly difficult to fully educate students within the confines of an undergraduate degree. Thus, the demand for master's degrees in computer science and engineering is expecting to continue to rise. According to the Bureau of Labor Statistics, occupations that require a master's degree are projected to grow the fastest between now and 2022. According to Forbes, a master's degree in computer science ties for first place with physician's assistant in occupational potential of graduate studies. Penn State currently receives around 1000 applications for their graduate program in computer science and engineering. The societal demand for a graduate degree in CSE is huge. It is part of the mission of the University and the College of Engineering to respond to societal needs,. We see expanding the availability of master's level computer science and engineering programs as an important aspect of the department's future. However, maintaining quality while handling a large influx of students is a major challenge. This program includes a plan to enable the department to offer and manage a high-quality program that meets the needs of the students, employers, and society at large. Enrollments for this program are expected to capped at fifty students per cohort, although an initial cohort of fifteen to twenty students will be enrolled during the first year. Students will initially be drawn from the existing pool of applications, being invited into the program on competitive basis if they have not been selected for a PhD or MS program. Since the existing MEng program is underutilized, the addition of this program will not affect enrollments of any existing program. Students must start in the fall term and continue with their cohort, finishing in the summer. Students who do not make sufficient progress in the program will not be allowed to continue to the next semester.	

Engineering Faculty Council
November 18, 2014

Pre-award Process

- Ability to submit proposal very close to the proposal deadline is greatly appreciated. This is not the case in many universities.
- The submitted packages are of generally high quality.
- The staff has helped me interpret the FOA requirements on several occasions, which was very helpful.
- The main issue I encountered is responsiveness. I find that perhaps a half of my requests submitted by email are ignored and half of phone messages remain unanswered. I sometimes had to make physical visits to OERA to receive attention. My suspicion is that the workload presented to OERA staff may be greatly in excess of the available resources (i.e. the number of staff members)
- In my previous experiences at a peer (Big 10) research university, I found the proposal submission process to be greatly superior. The staff was immediately and consistently available and proactive, which in effect encouraged me to submit more proposals than at Penn State. At this peer institution the pre-award staff also frequently proofread the proposals and even made some corrections when encountering errors (typos) in the narrative. It would be nice if something like this were available here at PSU COE.

Post-award Process

- The myResearch web portal is an enormous step forward compared to the previous system
- The negotiation time for contracts is very long, but my understanding is that this is also the case with many other universities.
- Two of my sponsors encountered issues with untimely invoicing and directly contacted me to complain