Engineering Faculty Council
Meeting Agenda

October 21, 2014
12:00 noon
202 Hammond

1. Approval of minutes for the meeting of September 16, 2014
   Minutes posted on ANGEL

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
   - Update on EFC Website

1. Approval of minutes for the meeting of August 26, 2014
   Minutes approved anonymously.

2. Updates from Undergraduate Studies Committee (Megan Marshall)
   No updates - no meeting took place this year yet.

3. Updates from Graduate Studies Committee (Wang-Chien Lee)
   - Two proposals approved, one returned. Pending proposals; received comments from other members of the EFC
   - Discussion of the internal process in GSRC. A clarification was provided – GSRC makes the recommendation, and EFC votes but usually follows that recommendation. From time to time concerns arise and are resolved in EFC.
   - Do the course proposals have to address every comment made? They have to be addressed, but do not have to necessarily make a change. EFC makes the final approval.
   - EFC should receive the executive summary of the review from the GSRC
   - EFC Chair recommends to identify departmental replacement if an EFC member cannot attend the EFC meeting
   - GSRC decides on the most efficient way to do business within GSRC (by email, Box, or in person)
   - Next time EFC will expect a summary sheet of GSRC to be voted upon

4. Updates from Engineering Technology Committee (Ron Land/Terry Speicher)
   No report.

5. Updates from Faculty Senate (Peter Butler)
   Several highlights of the September 9, 2014 Senate meeting:
   - Response of the PA State Senate Bill 1940. The PA Bill proposed the exclude the faculty representative, PSU President, and student representative from membership in the Board of Trustees. The Senate felt it was inappropriate not to have faculty representation and provided a strong response.
   - Forensics report on AD88 (Code of Responsible Conduct) and AD86 (Acceptance of Gifts and Entertainment).
• Revisions to Senate Policy 54-00 and all related Senate policies on Academic Warning, Drop, Action, and Reinstatement. There was no mechanism in place to force advising for those students who fall behind. There is a range of policies that Senate approved that will trigger formal action in the future.

6. Dean’s Report (Catherine Harmonosky, Interim Associate Dean for Graduate and Undergraduate Education)

• Instruction and equipment research grant initiative: proposals received and 12 selected for funding ($1M total) – will be notified soon. There were some lessons learned and there will be second round in spring, but a slight re-write of the RFP will occur to take into account the lessons learned.

7. Process and tentative approval schedule for departmental proposals on 1-year M.S. programs (Catherine Harmonosky, Interim Associate Dean for Graduate and Undergraduate Education)

• There will be a significant increase of workload for EFC to facilitate the approval process.
• Dean feels it is important to increase our MS student numbers, which will make us more competitive and also have a positive revenue aspect.
• Timing is essential. Need to be prompt so proposals can go through the PSU system on time.
• All proposals must submit the Program Change proposal.
• Feedback on proposal available by contacting Catherine Harmonosky, Betty Mantz, or Elizabeth Price (Graduate Educations Administration).
• First obtain department approval and then send the proposal for consultation. It is expected to have consultation with other units outside CoE that offer engineering programs (Commonwealth campuses and certain other UP Colleges). It is appropriate to request timely response from consultation (a few weeks).
• Proposal must be next reviewed by the Graduate Studies and Research Committee (GSRC).
• If approved, the proposal is presented to EFC for approval and CoE approval.
• University-level review ensues, including the Graduate Council Joint Committee.
• Specific language is important in proposals: the term “option” in the context of the new 1-yr MS degree triggers specific constraints imposed by the Graduate School and is therefore important to avoid. Instead, the use of term “pathway” is recommended.
• Graduate Council meetings require agenda items sent ahead of time: Oct 23 - agenda items need to be sent to Grad Council for Nov meeting; Nov 21: agenda items need to be sent to Grad Council for Dec meeting.
• There will probably be 5 proposals in the “program change” category.
• In Spring we will see more new programs.
• Total expected number of proposals is 11; maybe more if departments are developing them without requesting CoE funding.
• There are two types of proposals - Type A requires no approval (compressed internally in departments to obtain MS in one year); Type B requires review by EFC.
• MS PSU policy is that a thesis or a scholarly paper is required (as defined by dept).
• MEng has to have a culminating experience – up to dept (could be more applied).
• A question was raised whether many students jump on a non-thesis pathway due to its apparent reduced requirements
• GSRC will manage approvals & reviews through the cloud (Box). A suggestion was made to provide access to Box to ~2 people from a requesting department to facilitate a smoother and more expedient review
• We may want to temporarily appoint additional members of EFC to GSRC to help manage the increased workload
• EFC Bylaws specify a minimum of 7 voting members in EFC, but it does not state how many of them need to vote; would like to have all members vote.
• The steps of the approval process will be put on Angel

8. Other Business

• Outdated EFC website – should be discussed in the future. Bylaws of the EFC are available, but not from the CoE website.
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<th>Description or Rationale for Curricular Actions</th>
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| **A E 471 – Construction Management of Residential Building Projects**  
Submitted by: Ali Memari | ADD - Permanent Course Number | The course Construction Management of Residential Building Projects is designed to introduce the students to a general understanding of the construction industry, basic principles of project planning and management, contracts, budget and project administration and execution as applied to residential building construction. The content of the course is intended to provide the student with the knowledge, tools, and understanding of processes and tasks necessary to manage residential building projects to completion successfully and within the framework of quality control, code compliance, and safety, while minimizing risks. The scope of the residential construction considered in this course is primarily focused on single-family dwellings and multi-family dwellings. Furthermore, most of the topics covered can be applicable to new construction, remodeling, as well as repair projects. The course is expected to be of interest mainly to students in Architectural Engineering, Civil and Environmental Engineering, and Architecture. However, since this course is also a required course for a minor in Residential Construction, it is designed to allow students from any major with at least 6th semester standing to enroll in the class. |
| **CH E 230 – Computational Tools for Chemical Engineering**  
Submitted by: Andrew Zydney | ADD – Permanent Course Number | This 1-credit course will cover the key computational tools needed by Chemical Engineering students. Specific topics of interest include: constructing high quality graphs, statistics and linear regression, solving coupled algebraic equations, solving ordinary and partial differential equations, and matrices. Since the problems being solved will include differential equations, students will need to complete MATH 251 (ordinary and partial differential equations) prerequisite in order to be prepared for CH E 230. This course will be an elective until the new CH E curriculum is approved. At that point, this course will be required for all Chemical Engineering students. The information provided by this course will enable the students to have a better understanding of using and selecting the proper computational tools for use in solving problems related to Chemical Engineering such as material balances, thermodynamics, transport, and kinetics. |
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<td><strong>E SC 386 – Engineering Principles of Living Organisms</strong>&lt;br&gt;Submitted by: Patrick Drew</td>
<td>ADD - Permanent Course Number</td>
<td>To face the engineering challenges of the 21st century, undergraduate engineers need a quantitative understanding of how biological systems function. Many of the components of living organisms have direct analogues in human-made engineering devices, circuits and systems. Thus, living organisms and their parts are amenable to the same quantitative analysis. The objectives of this course include teaching students how to apply physical science and engineering principles to problems in biology, at scales from molecules to organisms. Students will also use engineering approaches, such as optimization, to determine how organisms approach trade-offs in growth, form and signaling. For Engineering Science undergraduates, this course will serve as a foundational elective. The mathematics used in the course necessitate MATH 251 as a prerequisite. The discussion of bioelectricity requires an understanding of electromagnetism and waves at the level of PHYS 214. As a basic knowledge of chemistry and chemical reaction kinetics is also needed to understand many of the concepts in the course, CHEM 110 is a prerequisite.</td>
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<td><strong>I E 424 – Process Quality Engineering</strong>&lt;br&gt;Submitted by: Jey Chandra</td>
<td>CHANGE - Modification of Prerequisites</td>
<td>The course content of I E 424 is not being changed. However, the prerequisites are being updated. MATH 220 or B E 301 cover matrix operations and are currently listed as the pre-requisites for IE 424, because IE 424 covers regression models and vector and matrix operations taught in MATH 220 or B E 301 are essential for performing the calculations required in regression analysis. But the regression models is the last topic in IE 424 and hence are taught at the end of IE 424 and students who take either MATH 220 or B E 301 would have gained the necessary knowledge in vector and matrix operations, by the time regression models are taught in IE 424.</td>
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<td><strong>ME 360 – Mechanical Design</strong>&lt;br&gt;Submitted by: Eric Marsh</td>
<td>CHANGE - Modification of Prerequisites</td>
<td>The course content of ME 360 is not being changed. However, the prerequisites are being updated. ME 360 requires students to do simple design calculations and analyses. End of semester topics involve calculations that are better solved using simple computer programs. By taking ME 360 and CMPSC 200 concurrently, students can apply their programming coursework to solving problems involving real world engineering applications. Introductory computer programming (including loops, arrays, logic, and various calculation functions) is required for students to successfully complete ME 360. The required skills gained in CMPSC 200 are needed at end of the semester in ME 360. The students are prepared for the course content in ME 360 by taking CMPSC 200 concurrently.</td>
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<td><strong>M E 450 – Modeling of Dynamic Systems</strong>&lt;br&gt;Submitted by: Eric Marsh</td>
<td>CHANGE - Modification of Prerequisites</td>
<td>The course content of ME 450 is not being changed. However, the prerequisites are being updated. The material taught in M E 345 (data analysis and presentation, data acquisition and processing, dynamic characteristics of instruments, filter circuits, and sensors) provides important background on M E 450 topics. However, the pacing of the material is such that students taking the two courses concurrently will always have the needed M E 345 material in advance of its coverage in ME 450.</td>
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<td><strong>NUC E 301 – Fundamentals of Reactor Physics</strong>&lt;br&gt;Submitted by: Igor Jovanovic</td>
<td>CHANGE - Modification of Prerequisites</td>
<td>The course content of NUC E 301 is not being changed. However, the prerequisites are being updated. The material taught in Physics 214 (optics and quantum mechanics) provides important background on NUC E 301 topics (atomic and nuclear models, radioactivity, principles of nuclear reactors, nuclear power, and radiation shielding). NUC E 301 offers a partial targeted review of select relevant topics taught in Physics 214. Combined with simultaneous instruction of Physics 214, this approach allows the entire scope of NUC E 301 to be taught effectively.</td>
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<td><strong>NUC E 430 – Design Principles of Reactor Systems</strong>&lt;br&gt;Submitted by: Seungjin Kim</td>
<td>CHANGE - Modification of Prerequisites</td>
<td>The course content of NUC E 430 is not being changed. However, the prerequisites are being updated. We are proposing to change prerequisite requirements for NUC E 430&lt;br&gt;• The current prerequisites are: M E 410, NUC E 301 or NUC E 401.&lt;br&gt;• Proposed changes include: (a) M E 410 to be prerequisite or concurrent; (b) Replace NUC E 301 with NUC E 302; and (c) Remove NUC E 401.&lt;br&gt;Justifications for the proposed changes are as follows:&lt;br&gt;(a) Change M E 410 to be prerequisite or concurrent from prerequisite: Topics covered in NUC E 430 do not require comprehensive understanding of topics covered in M E 410 - Heat Transfer. It is sufficient for students to understand NUC E 430 topics when M E 410 is taken concurrently. This change does not require any changes in students’ plan of study.&lt;br&gt;(b) Replace NUC E 301 with NUC E 302: NUC E 302 (Introduction to Reactor Design) is a more appropriate prerequisite for NUC E 430 than NUC E 301 (Fundamentals of Reactor Physics). Additionally, since NUC E 301 is a prerequisite to NUC E 302, having NUC E 302 as a prerequisite for NUC E 430 ensures students have adequate knowledge base for NUC E 430. This change does not require any changes in students’ plan of study.</td>
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<td><strong>NUC E 430 continued</strong></td>
<td>CHANGE - Modification of Prerequisites</td>
<td>(c) Remove NUC E 401: This course is no longer offered and is not needed for NUC E 430. Additionally, inclusion of NUC E 302 as a prerequisite ensures students have adequate knowledge base covered in NUC E 401. This change will not impact the students’ plan of study.</td>
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<td><strong>NUC E 431W – Nuclear Reactor Core Design Synthesis</strong></td>
<td>CHANGE - Modification of Prerequisites</td>
<td>The course content of NUC E 431W is not being changed. However, the prerequisites are being updated. NUC E 431W requires students to work in teams to solve an engineering challenge and present a solution. The semester begins with work emphasizing the engineering and technical issues associated with the problem. Later in the semester the students present their work in written and oral presentations. By taking NUC E 431W and ENGL 202C concurrently, students can apply their developing writing skills to documenting their design work.</td>
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Submitted by: Arthur Motta
The Control Systems Caucus in Mechanical Engineering voted to change title of course from M E 555 (Automatic Control Systems) to M E 555 (Linear System Theory and Control). The course title is changing to better reflect the course content.

This course is designed to equip students with the tools necessary to understand and analyze problems in the healthcare delivery environment using systems engineering methodologies. This course focuses on: 1) the healthcare delivery system; 2) healthcare system performance evaluation; and, 3) modeling and improving healthcare systems. The first part will provide a broad overview of the healthcare system and focus on the operations, stakeholders, and policies. The second part will focus on healthcare system data, statistical analysis, and quality improvement. The third part will focus on quantitative models for healthcare system performance through the use of optimization, stochastic modeling, and microeconomics.

The goal of the course is to provide a systematic quality-driven process for making effective financial and operating decisions in the healthcare industry. It will provide an active learning environment through the application of course tools and methodologies to real-world healthcare systems. Case studies, homework assignments, and mini-projects will be used to reinforce the course material. A final course project will then allow students to integrate all three course sections to solve a healthcare problem from the initial definition to decision-making stages.

The course focuses on high-power, in-vehicle energy storage technologies used in hybrid electric vehicles, including advanced batteries, fuel cells, ultracapacitors, and flywheels. An interdisciplinary approach with mechanical, materials, electrical, and chemistry-based concepts provides the foundation to understand the operation and application of these energy storage devices. The course provides a synopsis of hybrid electric and fuel cell vehicle design, control, and simulation to determine the effect of energy storage components on performance and fuel efficiency.

The course starts with an overview on LED technology. A practical introduction to LEDs will be delivered to cover the generic topics of superluminescent diodes. Additionally, advances in LED-based solid state lighting and display technology will also be surveyed and linked to the fundamental material and device properties that have been previously discussed.
Neuroscience Data Analysis

Modern neuroscience experimental methods can generate enormous amounts of complicated data, and a wealth of techniques has sprung up drawing from a wide variety of fields to analyze it. In this course, students will learn how to utilize a toolbox of mathematical and computational techniques to analyze electrophysiological, optical and anatomical data. This course will cover the biophysical origin and measurement of brain signals, as well as the theoretical background of modern analysis methods and their practical implementation. Topics covered include spectral methods, neural encoding and decoding, information theory and image analysis.

Prerequisites should simply state Math 141, Biol 469 is concurrent or prerequisite. "or equivalent" is always implied and should not be included. "Students should have basic knowledge of neuroscience" should also be deleted as it is redundant with Biol 469.

In relationship of course to major - there is no neural engineering major or minor. So reference should be perhaps to ESM students interested in neural engineering.

Very in-depth syllabus. Must make sure students have prerequisites otherwise it would be a waste to both Professor and students.

Power Semiconductor Device

Engineering feat, power semiconductor devices, PSD, are defect-engineered devices that are complex in architecture and costly in production. Semiconductor devices for power and energy are a natural industry focus following the challenge associated with further miniaturization of MoO's MOSFET's. Power MOSFET are rapidly displacing traditional power devices with their high input impedance, simple voltage control and negative thermal coefficient. Silicon RF power MOSFET's devices enable multimedia wireless evolution to G3/G4 and beyond. Novel power devices enhance power management efficiency, by enabling new distributed vs linear power architecture. Power MOSFET switches withstand high current in the ON-state and a high voltage in the OFF-state; coupled with operating at high temperatures. Consequently, high temperature operating wide-band gap materials hold more promise for power applications, and long-term device-reliability is a critical issue. The evolution of devices drew from advances in regular electronics and is today influencing regular electronics designs, particularly, with its partiality to vertical structures, and full 3D-utilization of wafer real estate. The course catalogues the various devices, the physics of operation, the wide-band-semiconductor material suitable for power electronics.

I found the long description to be unusual. It is supposed to be a description of the course, but it instead a description of various aspects of MOSFET's. I recommend asking that the description be rewritten from the perspective of "what will the course cover" so students can make a decision about whether to take the course or not. The last sentence summarizes the course, but the preceding sentences don't really relate to the last sentence. Also, in the first sentence, is "Engineering feat" correct? I've never heard of a device called "feat".

Remove the list of special facilities - what is listed is not special.

Additional consultation including especially EE & physics.

Otherwise looks good.

This proposal looks good, but I do agree that the course description should be revised to better reflect the material that will be covered in the course rather than to provide an overview of the field. I think this is a great course. With the components of field trip to Fairchild, guest lecturers, and student presentations, I think students will learn well. The course outline reveals that this course has a very good structure to cover a wide range of topics. But I agree the course description can be more brief.

Underwater Sound Propagation

This course has not been offered in five or more years, and the program has no plans to offer it in the future.

Workforce Engineering

This course studies the field of workforce engineering, and bridges the areas of human factors engineering, production planning, and optimization. The objective of the course is to examine state-of-the-art practices, models, solution techniques, and opportunities for graduate research. The course studies quantitative applications related to determining workforce size, skill sets, and multifunctionality in service and manufacturing systems based on measurable quality and productivity performance. Students will develop the skills necessary to model and solve problems considering the tradeoffs between speed and accuracy.