MEMORANDUM

TO: Darryll Pines
    Dean, A. James Clark School of Engineering

FROM: Phyllis Peres
      Associate Provost for Academic Planning and Programs

SUBJECT: Proposals to modify the Post-Baccalaureate Certificate in Engineering (PCC log nos. 08062, 08063, and 08067)

At its meeting on today, the Senate Committee on Programs, Curricula and Courses approved your proposals to modify the Post-Baccalaureate Certificate in Engineering by adding specializations in Technology Ventures and Innovation, Systems Engineering, and Energetic Concepts, and to offer these specializations online. Copies of the approved proposals are attached.

The changes are effective Fall 2009. The College should ensure that the changes are fully described in the Graduate Catalog and all relevant descriptive materials, and that all advisors are informed.

CWR/

Enclosure

cc: Carmen Balthrop, Chair, Senate PCC Committee
    Sarah Bauder, Office of Student Financial Aid
    Reka Montfort, University Senate
    Barbara Hope, Data Administration
    Denise Nadasen, Institutional Research & Planning
    Anne Turkos, Archives
    Linda Yokoi, Office of the Registrar
    Thomas Castonguay, Graduate School
    Gary Pertmer, A. James Clark School of Engineering
    George Syrmos, A. James Clark School of Engineering
    Paul Easterling, A. James Clark School of Engineering
    James Green, A. James Clark School of Engineering
THE UNIVERSITY OF MARYLAND, COLLEGE PARK
PROGRAM/CURRICULUM PROPOSAL

DIRECTIONS:
- Provide one form with original approval signatures in lines 1 - 4 for each proposed action. Keep this form to one page in length.
- Early consultation with the Office of the Associate Provost for Academic Planning & Programs is strongly recommended if there are questions or concerns, particularly with new programs.
- Please submit the signed form to Claudia Rector, Office of the Associate Provost for Academic Planning and Programs, 1119 Main Administration Building, Campus.
- Please email the rest of the proposal as an MSWord attachment to pcc-submissions@umd.edu.

DATE SUBMITTED 04/21/09

PCC LOG NO. 08063

COLLEGE/SCHOOL ENGR

DEPARTMENT/PROGRAM OAAE

PROPOSED ACTION (A separate form for each) ADD _X_ DELETE CHANGE

DESCRIPTION (Provide a succinct account of the proposed action. Details should be provided in an attachment. Provide old and new sample programs for curriculum changes.)

Establish a new specialization in Systems Engineering within the existing Post-Baccalaureate Certificate in Engineering.

JUSTIFICATION/REASONS/RESOURCES (Briefly explain the reason for the proposed action. Identify the source of new resources that may be required. Details should be provided in an attachment.)

See attached.

APPROVAL SIGNATURES - Please print name, sign, and date

1. Department Committee Chair GEORGE SYRNOIS 4/21/09
2. Department Chair GEORGE SYRNOIS 4/21/09
3. College/School PCC Chair 4/12/09
4. Dean 2/11/09
5. Dean of the Graduate School (if required) 5/8/09
6. Chair, Senate PCC 5/15/09
7. Chair of Senate 5/15/09
8. Vice President for Academic Affairs & Provost PHYLLIS PERES 5/15/09

VPAAP 8-05
Proposal to add a specialization in Systems Engineering to the Existing Post-Baccalaureate Certificate in Engineering

Systems Engineering (SE) currently exists as an academic option under the Professional Master of Engineering (ENPM) Program. This option was first made available in 1994.

This specialization has been one of the most successful (in terms of the size) over the past several years and the demand is increasing. This certificate option would be attractive to a larger number of engineers, especially those who may already have an advanced degree but desire a Systems Engineering education to enhance their work performance.

Therefore, we propose the creation of the Systems Engineering specialization within the existing Post-Baccalaureate Certificate in Engineering. We will start this academic option in the Fall 2009 semester by offering at least two core courses in that term and at least two courses in every subsequent semester.

This specialization will be administered through OAEE making sure that the necessary student services are provided. As with all programs in OAEE, curriculum and academic oversight for the Systems Engineering program will be through a faculty advisory committee and the ISR Executive Director that will collaborate with the OAEE Executive Director, making sure that both commitment to support this specialization and academic excellence are in place. Evaluation and assessment of this specialization will be performed by both ISR and OAEE, and its delivery through the Clark School’s Distance Education Technology and Services Office will ensure state-of-the-art accessibility of the associated courses. The new specialization will comply with all UMCP policies and requirements for graduate education.

The curriculum would consist of four courses: three core courses and one course from the management core.

Core Courses

**ENPM 641 Systems Concepts, Issues and Processes (3)** (Crosslisted with ENSE 621)
Prerequisite: permission of department. This course (along with ENPM 642) is an introduction to the professional and academic aspects of systems engineering. Topics include models of system lifecycle development, synthesis and design of engineering systems, abstract system representations, visual modeling and unified modeling language (UML), introduction to requirements engineering, systems performance assessment, issues in synthesis and design, design for system lifecycle, approaches to system redesign in response to changes in requirements, reliability, trade-off analysis, and optimization-based design.

**ENPM 642 Systems Requirements, Design and Trade-Off Analysis (3)** (Crosslisted with ENSE 622) Prerequisite: ENPM 641 and permission of department. This course builds on material covered in ENPM 641, emphasizing the topics of requirements engineering and design and trade-off analysis. The pair of courses serves as an introduction to the professional and academic aspects of systems engineering. Liberal use will be made of concepts from the first course, ENPM641, including models of system lifecycle development, synthesis and design of engineering systems, visual modeling and unified modeling language (UML), requirements engineering, systems performance
assessment, issues in synthesis and design, design for system lifecycle, approaches to system redesign in response to changes in requirements, reliability, trade-off analysis, and optimization-based design.

**ENPM 643 Systems Projects, Validation, and Verification (3)** (Crosslisted with ENSE 623) Prerequisite: ENPM 642 and permission of department. This course builds on material covered in ENPM 641 and ENPM 642. Students will work in teams on semester-long projects in systems engineering design, using the modeling framework developed in the preceding two courses in the sequence to explore system designs that are subjected to various forms of testing. Students will be using all of the concepts from prior courses, as well as topics introduced in this class including validation and verification, model checking, testing, and integration.

**Management Core**

**ENPM 644 Human Factors in Systems Engineering (3)** (Crosslisted with ENSE 624) Prerequisite: permission of department. This course covers the general principles of human factors, or ergonomics as it is sometimes called. Human Factors (HF) is an interdisciplinary approach toward dealing with issues related to people in systems. It focuses on consideration of the characteristics of human beings in the design of systems and devices of all kinds. It concerns itself with the assignment of appropriate functions for humans and machines - whether the people serve as operators, maintainers, or users of the system or device. The goal of HFs is to achieve compatibility in the design of interactive systems of people, machines, and environments to ensure their effectiveness, safety and ease of use.

**ENPM 646 Systems Life Cycle Cost Analysis and Risk Management (3)** (Crosslisted with ENSE 626) Prerequisite: permission of department. This course covers topics related to estimating the costs and risks incurred through the lifetimes of projects, products and systems. In addition, treatment is given to methods that determine the drivers of costs and risks and then propose the most effective alternatives to reducing them. The course covers relevant analytic tools from probability and statistics and also important managerial and organizational concepts. Extensive use will be made of case studies and examples from industry and government.

**ENPM 647 System Quality and Robustness Analysis (3)** (Crosslisted with ENSE 627) Prerequisite: permission of department. This course covers systems engineering approaches for creating optimal and robust engineering systems and for quality assurance. It provides an overview of the important tools for quality analysis and quality management of engineering systems. These tools are commonly used in companies and organizations. Focus will be placed on the Baldrige National Quality Program, ISO 9000 certification, 6-sigma systems, and Deming total quality management to examine how high quality standards are sustained and customer requirements and satisfactions are ensured. The Taguchi method for robust analysis and design is covered and applied to case studies. Issues of flexible design over the system life cycle are addressed. Statistical process control, international standards of sampling, and design experimentation are also studied.