PURDUE UNIVERSITY | College of Engineering

Engineering Faculty Document
No.: 106-24
March 6, 2024

TO: The Engineering Faculty

FROM: The Interdisciplinary Engineering Team

RE: New Engineering Major

The Interdisciplinary Engineering team has approved the following new major. This action is now submitted to the Engineering Faculty with a recommendation for approval.

TITLE:

Major in Systems Engineering, Interdisciplinary Engineering MS/MSE

DESCRIPTION:

The M.S. in Interdisciplinary Engineering degree, with a major in Systems Engineering will provide students with the opportunity to study and gain skills in the tools, methods, and processes of designing, analyzing, controlling, and improving complex engineered systems. In partnership with the Systems Collaboratory, the program has been designed to produce students with firm grounding in interdisciplinary engineering and well prepared to lead and execute transdisciplinary processes that result in systems that are responsive to stakeholder's needs. Specifically, the program will educate students to develop new products, services, and organizations to address grand challenges facing society.

RATIONALE:

The Systems Engineering concentration within the IDE program stands out as the most sought-after concentration. While applicants to the Interdisciplinary Engineering program aren't obligated to select a concentration, a significant number opt for Systems, evident from the multitude who arrive with their sights set on this specialized track. Each semester, we receive over 20 new applications specifically for the Systems concentration, with many more students opting to add it later during their academic journey. Presently, approximately 85 students are actively pursuing this concentration.

The enthusiasm among our current students for a more comprehensive interdisciplinary major in Systems Engineering is palpable. They seek deeper immersion beyond the confines of the existing 12-credit structure, aspiring to hone their expertise and bolster their transcripts and resumes with a more obvious acknowledgment of their proficiency in multifaceted engineering systems.

This growing demand isn't confined to student circles alone. Employers of Purdue graduates have expressed interest in having a clearly defined program for the design, analysis, improvement, and control of the next generation of complex systems to address the challenges facing organizations and society. Conversations between faculty, staff, and representatives from various industries—ranging from automotive, manufacturing, healthcare, and business consulting to transportation, aerospace, agriculture, and government agencies—underscore the pressing need for a workforce proficient in systems engineering principles.

In response, the Interdisciplinary Engineering team in partnership with the Systems Collaboratory are poised to address these industry and government imperatives with this comprehensive major tailored to the demands of modern systems engineering, ensuring our graduates are equipped to tackle the complex challenges of tomorrow.

Tamara L. Kuhn

Associate Dean, Professional and Graduate Education

Link to Curriculog entry:

https://purdue.curriculog.com/proposal:27820/form (draft)

MS Systems Engineering Additional Information

Target Audience

The students will generally include returning graduate students who are seeking additional knowledge and expertise in systems engineering, within an interdisciplinary context. These returning students generally will be at Purdue with the support of their employers who operate in the industries described in the previous section. Students in the program will have a strong interest in systems, with the intent of becoming "deep generalists" who will eventually lead efforts that develop new products, services, and organizations that will design, analyze, improve, and control the next generation of complex systems.

Major in Systems Engineering Requirements

A. 12 credit hours in the systems core
   - SYS 50000 Perspectives on Systems
   - SYS 51000 Tools and Methodologies for Designing Systems
   - SYS 53000 Practical Systems Thinking
   - SYS 59000 Systems Engineering Processes and Professional Competencies*

B. 3 credit hours in systems analysis and design
   - AAE 55000 Multidisciplinary Design Optimization
   - AAE 56000 Systems of Systems Modeling and Analysis
   - AAE56400 Systems Analysis and Synthesis
   - AAE 59000 Surrogate Methods**
   - IE 53300 Industrial Applications of Statistics
   - IE 58000 Systems Simulation
   - IE 59000/BME 59500 Complex Systems: Theory & Applications
   - ME 55300 Product & Process Design
   - ME54100 Engineering Design: A Decision-Based Perspective
   - ME 57500 Theory & Design of Control Systems
   - ME 58400 System Identification**

C. 3 credit hours in specialty engineering
   - AAE 59000 Principles and Methods of Safe Aerospace System Design
   - AAE 59000 System Safety & Reliability
   - EEE 53000 Life Cycle Assessment: Principles And Applications**
   - IE 53200 Reliability
   - IE 55800 Safety Engineering
   - IE 57700 Human Factors in Engineering
   - ME 57100 Reliability Based Design

D. 3 credit hours in engineering economics and decisions
   - IE 54500 Engineering Economic Analysis
   - IE 54600 Economic Decisions in Engineering
   - ECE59500 Introduction to Game Theory

E. 3 credit hours in program and project management
   - GRAD59000 Program Management: A Comprehensive Overview of the Discipline
   - IE59000 Project Management

F. 6 credit hours in engineering electives

*Online Only
**On-Campus Only

Will new faculty expertise or new faculty members be needed to launch this major?

No. There is already a wealth of faculty expertise and teaching in, or adjacent to systems engineering within the College of Engineering. In addition, the Purdue Systems Collaboratory has teaching staff, faculty, and engages other staff to offer their core curriculum.

[End]