PURDUE UNIVERSITY | College of Engineering

Engineering Faculty Document
No.: 65-24
February 28, 2024

TO: The Engineering Faculty

FROM: The Faculty of the College of Engineering

RE: New Engineering Program

The Faculty of the College of Engineering, Interdisciplinary Engineering, has approved the following new degree program from the College of Engineering. This action is now submitted to the Engineering Faculty with a recommendation for approval.

TITLE: Doctor of Engineering

DESCRIPTION:

The Doctor of Engineering (D.Eng.) degree is an interdisciplinary program designed to meet the needs of working professionals who are seeking to advance their professional standing and academic knowledge, as well as add a doctoral credential. The program will primarily cater to working professionals with significant industry experience who wish to complete the program online following a flexible and self-paced schedule. Market research shows a high demand for an interdisciplinary degree from working professionals. Key industry partners (Cook, Lilly, Cummins, Naval Surface Warfare Center, Crane Division) have indicated their support for such an industry-focused program.

A Doctor of Engineering is earned by demonstrating research expertise in an engineering-related field of study, and direct application of the research to engineering practice in real-world, industry, commercial, defense, or other areas of operation and utilization.

Obtaining a Doctor of Engineering offers students numerous benefits, both personally and professionally. Some key advantages include:

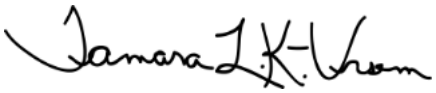
1. **Expertise and Specialization:** Doctoral programs allow individuals to delve deeply into a specific area of engineering, becoming experts in their chosen field. This expertise can lead to unique insights, innovations, and contributions to the advancement of the discipline.
2. **Career Advancement:** A doctoral degree is often required for positions in academia, research institutions, and high-level industry roles. It opens doors to leadership positions, consulting opportunities, and higher salaries.
3. **Intellectual Growth:** Pursuing a doctoral degree challenges individuals to think critically, push boundaries, and engage with the latest developments in engineering. It fosters intellectual curiosity and a lifelong passion for learning.
4. **Credibility and Recognition:** Holding a doctoral degree enhances one's credibility and authority in the field. It signifies a level of expertise and commitment that commands respect among peers, employers, and the broader community.

This 90-credit-hour program features research methodology and professional development coursework, advanced mathematics and statistics, a wide variety of engineering courses, and a culminating applied research project. Students will be required to have a master's degree, and they may transfer up to 30 credit hours from that degree or other non-degree coursework into the D.Eng. program, subject to faculty review.

This program will be approved for online, residential, and hybrid, with an initial focus on the online modality. The expectation is that most students will be interested in pursuing the program online. While this is an Interdisciplinary Engineering degree, departments can establish discipline-specific concentrations and majors within this degree structure. This does not preclude departments from developing their own Doctorate degree programs in the future.

RATIONALE:

There is significant market need for engineers with a doctoral degree. The residential Ph.D. engineering programs at Purdue University have robust research requirements that require students to live near West Lafayette, IN, limiting the total addressable market. The research requirements in the online D.Eng. program will allow students to complete their projects at their current locations without the need to relocate. D.Eng. students are more likely to engage in research related to their unique context, which may be related to on-the-job process improvements, scalability, new designs, or many other possible outcomes; projects are expected to typically have a stronger focus on engineering practice or application compared to a stronger focus on fundamental knowledge for PhD students. Purdue University is the second largest conferring institution in the United States for engineering Ph.Ds, with only two fewer graduates than the largest program, Georgia Tech (Lightcast, 2024).



Associate Dean, Professional and Graduate Education

Link to Curriculog entry: https://purdue.curriculog.com/proposal:26992/form (drafted)

Degree Characteristics

The online D.Eng. program requires students to have earned a Master's degree in Engineering, Physics, Computer Science or other STEM related disciplines, which builds on the success of existing online and residential programs and will create a pipeline of applicants. Students will be able to have their Master's degree evaluated for up to 30 credits of transfer credit towards their D.Eng. program. The research project in the D.Eng. program will be a unique feature compared with the residential Ph.D. offerings. Students in the D.Eng. program will have an advisor and a faculty committee, and like Ph.D. students, they will engage in rigorous research. The major differences relate to the research site and research type. D.Eng. students are more likely to engage in research related to their unique context, which may be related to on-the-job process improvements, scalability, new designs, or many other possible outcomes; projects are expected to typically have a stronger focus on engineering practice, upgrading their skills in a specific area or application. The program also has a stronger focus on professional development coursework than traditional PhD programs. The interdisciplinary nature of the program, and the breadth of participating faculty will allow students to work with an advisor who will help them construct individually tailored research projects that will not only satisfy D.Eng. requirements, but also improve the organizations to which the students belong.

Distinction between a PhD and a professional Doctorate degree

A PhD in Engineering is earned by demonstrating research independence in an engineering-related field of study and generation of new knowledge. A Doctor of Engineering is earned by completion of interdisciplinary professional coursework and demonstration of research independence in an engineering-related field of study, and direct application of the research to engineering practice in real-world, industry, commercial, defense, or other areas of operation and utilization.

In each program, dissemination of knowledge is key to the training, but may differ depending on the context of each student's unique context (i.e. presentations at scientific or trades conference, white papers, internal reports, peer-reviewed manuscripts in archival journals, book chapters).

Curricular Components and Requirements

Curricular Components

Core Courses*: These courses are intended to set up D.Eng. students for success for the duration of their program. Courses prepare new students to tailor the degree and research to their professional area of focus and/or current employer, create a plan of study, conduct applied research, and find a faculty advisor.

Foundational Courses: These courses are meant to provide a strong foundation in theoretical, quantitative, and professional concepts that will be utilized and reinforced in later coursework.

Technical Depth Courses: These courses provide the foundational concepts and theories that are applied in a students desired technical field. These courses should equip students to gain significant knowledge, experience, and capability in a particular technology or technical domain directly related to a student's career goals.

Professional and Applied Courses: These courses provide additional training, expertise and practice in areas that are important to student's professional development, but that might not be specific to one technical area. Examples include technical writing, pedagogical theory and practice, project management, product development, leadership development, grant and technical report writing.

D. Eng Research Courses: Course credit for multi-semester applied research project working closely with faculty advisor. Measurable outcomes of the research project include a final report/dissertation and demonstration of expertise in the topic area. Other outcomes of research include knowledge dissemination (i.e. presentations at scientific or trades conference, white papers, internal reports, peer-reviewed manuscripts in archival journals, book chapters).

Electives: Open-ended courses that may be tailored to meet a student's specific professional goals.

Note: Transfer credits from a student's Master's degree will be evaluated and applied to specific components of the degree.

*The Core Course requirement is not able to be adjusted nor receive applied transfer credit.

Degree Requirements

Curriculum Component	Courses / Examples	Credits
Core Courses*	ENGR 60100: Doctor of Engineering Fundamentals (1 credit) ENGR 60200: Research Fundamentals (3 credits) ENGR 60300: Doctor of Engineering Seminar (1 credit) 1 credit graduate-level Engineering Seminar coursework	6 credits
Foundational Courses	Graduate-level math (min 1 course) Statistics (min 1 course)	6 min
Technical Depth Courses	Technical Engineering Courses (see Appendix A) Other related fields, e.g.: Computer Science, Science, Advanced math, Stats, Agriculture (no more than 12 credits total in non-engineering courses)	27 min
Skills / Application Courses	Specialization courses (i.e. teaching, business, leadership, grant writing, etc.; see Appendix A)	12 min
D.Eng. Research Courses	Applied research or professional project	30 min
Electives	Open-ended, as desired	
	Total	90

*Purdue courses must be taken for Core Course requirements. Transfer credit may not be applied to the Core Course component.

Learning Outcomes and Assessment

Learning Outcomes

Upon completion of the D.Eng., students will be able to:

1. Envision, plan and conduct applied research and development activities
2. Identify, comprehend, analyze, evaluate and synthesize research and professional practice in one or more engineering disciplines
3. Employ quantitative, qualitative, analytic and statistical techniques to engineering problems
4. Communicate effectively and employ constructive professional and interpersonal skills
5. Apply advanced leadership practices to organizational challenges
6. Identify and execute ethical and responsible research and professional practices

Assessment of Outcomes

Progress towards achievement of the competencies required for D.Eng. graduates will be assessed throughout the student's doctoral program:

- Competency in technical foundations will be assessed through coursework via exams, oral presentations, written reports and other artefacts demonstrating individual and team capability.
- At the end of the Spring semester of the second year, students will present a formal proposal for their applied research to their dissertation advisory committee.
- Students will be assessed on their knowledge of their chosen technology discipline with a written and orally defended preliminary exam conducted by their graduate advisory committee at the end of their third year.
- Students will disseminate their research findings in a manner appropriate for their unique context (i.e. presentations at scientific or trades conference, white papers, internal reports, peer-reviewed manuscripts in archival journals, book chapters).
- Annual advisory committee meetings will assess progress toward completion of coursework and applied research.
- A final dissertation of the applied research project will be written and orally defended to the dissertation advisory committee for approval that all competencies are achieved.

New Course and Concentration Development

Three new courses have been envisioned for this Doctoral program and are being proposed separately to the ECC (see EFD numbers 79-24, 80-24, and 81-24). The three new courses are:

ENGR 60100: Doctor of Engineering Fundamentals (1 credit)

ENGR 60200: Research Fundamentals (3 credits)

ENGR 60300: Doctor of Engineering Seminar (1 credit)

Interested departments will have the opportunity to add concentrations or majors to the D.Eng. program at a later date.

Continuation of Program Development and Faculty Engagement

The D.Eng. program has a faculty and administrative committee devoted to continuing progress on the program. Discussions and engagements after a curricular approval will include:

- Admissions criteria
- Departmental collaborations
- Faculty commitment and compensation for chairs and committee members
- Program administration and operations

Appendix A: Course List

Core Courses:

ENGR 60100: Doctor of Engineering Fundamentals (1 credit) *

ENGR 60200: Research Fundamentals (3 credits) *

ENGR 60300: Doctor of Engineering Seminar (1 credit) *

BME 69000 - Seminar in Biomedical Engineering**

ECE 69400-001 - Electrical and Computer Engineering Seminar**

ENE 69000 - Seminar In Engineering Education**

IE 69700 - Graduate Seminar**

MA 51100 - Linear Algebra With Applications

MA 52700 - Advanced Mathematics For Engineers And Physicists I

MA 52800 - Advanced Mathematics For Engineers And Physicists II

STAT 51100 - Statistical Methods

STAT 51200 - Applied Regression Analysis

STAT 51300 - Statistical Quality Control

STAT 51400 - Design Of Experiments

STAT 51600 - Basic Probability And Applications

STAT 51700 - Statistical Inference

Required Course

* In development

** Will be offered for credit with assessments and online as needed

Technical Depth Courses from the College of Engineering:

AAE 51100 - Introduction To Fluid Mechanics

AAE 51200 - Computational Aerodynamics

AAE 51400 - Intermediate Aerodynamics

AAE 51900 - Hypersonic Aerothermodynamics

AAE 52300 - Introduction To Remote Sensing

AAE 53200 - Orbit Mechanics

AAE 53400 - Spacecraft Electric Propulsion

AAE 53700 - Hypersonic Propulsion

AAE 53800 - Air Breathing Propulsion

AAE 53900 - Advanced Rocket Propulsion

AAE 54800 - Mechanical Behavior Of Aerospace Materials

AAE 55000 - Multidisciplinary Design Optimization

AAE 55200 - Nondestructive Evaluation Of Structures And Materials

AAE 55400 - Fatigue Of Structures And Materials

AAE 55500 - Mechanics Of Composite Materials

AAE 55600 - Aeroelasticity

AAE 55800 - Finite Element Methods In Aerospace Structures

AAE 56000 - System-Of-Systems Modeling And Analysis

AAE 56100 - Introduction To Convex Optimization

AAE 56400 - Systems Analysis And Synthesis

AAE 56800 - Applied Optimal Control And Estimation

AAE 57500 - Introduction To Satellite Navigation And Positioning

AAE 59000 - Principles and Methods of Safe Aerospace System Design

AAE 59000 - Data Science in Mechanics of Materials

AAE 59000 - Design of Composite Materials and Structures

AAE 57100 - System Safety and Reliability

AAE 59000 - Surrogate Methods

AAE 59000 - Satellite Constellations and Formation

AAE 59000 - Applied Control in Astronautics

AAE 59000 - Aerospace Propulsion

AAE 59000 - Molecular Gas Dynamics

AAE 59000 - Nonequilibrium Hypersonic Flows

AAE 53300 - Space Traffic Management

AAE 59000 - Spacecraft Attitude Dynamics

AAE 59000 - Multi-Agent Autonomy and Control

AAE59000 - Computational Combustion & Propulsion

AAE 62400 - Laminar-Turbulent Transition

AAE 62600 - Turbulence And Turbulence Modeling

AAE 63200 - Advanced Orbital Dynamics

AAE 65400 - Fracture Mechanics

AAE 66600 - Nonlinear Dynamics, Systems, And Control

AAE 67500 - Advanced Signals And Systems For Satellite Navigation

ABE 59100 - Special Topics

BME 50100 - Biostatistics

BME 51100 - Biomedical Signal Processing

BME 52100 - Biosensors: Fundamentals And Applications

BME 58100 - Bio-Micro-Electro-Mechanical Systems (BioMEMS) & Biomedical Microsystems

BME 59500 - Neural Mechanisms of Health and Disease

BME 59500 - Medical Imaging Diagnostic Technologies

BME 59500 - Cell and Tissue Mechanics

CE 50701 - Geospatial Data Analytics

CE 50801 - Geographic Information Systems

CE 51300 - Lighting In Buildings

CE 52200 - Computer Applications In Construction

CE 53101 - Nanotechnology For Civil And Environmental Applications

CE 54300 - Coastal Engineering

CE 54400 - Subsurface Hydrology

CE 54900 - Computational Watershed Hydrology

CE 55000 - Physico-Chemical Processes In Environmental Engineering I

CE 57000 - Advanced Structural Mechanics

CE 57200 - Prestressed Concrete Design

CE 57300 - Structural Dynamics

CE 57900 - Structural Stability

CE 59100 - Advanced Structural Steel Design

CE 59500 - Finite Elements In Elasticity

CE 59700 - Logistics and Supply Chains

CE 59700 - Groundwater Contamination

CE 59700 - Groundwater Cycle

CE 59700 - UAS Based LiDAR Mapping

CE 59700 - UAS Based Mapping: Basic Principles

CE 59700 - UAS Based Photogrammetric Mapping

CE 59700 - Wells Hydraulics

CE 59700 - Data Science for Smart Cities

CE 59700 - Design of Urban Water Infrastructure

CE 59700 - Water Supply in Developing Countries

CE 59700 - Water Chemistry for Environmental and Ecological Engineering

CE 59700 - Sustainable Building Design Construction and Operation

CE 59700 - Plastics in Infrastructure and the Environment

CE 59700 - Biological Wastewater Treatment

CE 59700 - Introduction to Steel Railway Bridge Engineering

CE 59700 - Network Models for Connected and Autonomous Vehicles

CE 59700 - Nanomaterials for Civil and Environmental Engineering

CE 59700 - Nano-device for Energy Harvesting and Sensing

CE 59700 - Design Principles and Practices of Drinking Water Systems

CE 59700 - Built Environmental Modeling

CE 59700 - Advanced Concrete and Aggregates

CE 59700 - Non-Destructive Testing and Sensing for Civil Infrastructures

CE 59700 - Fundamentals of Nanomaterials and Nanotech

CE 65000 - Photochemical Reactors: Theory, Methods, And Applications Of Ultraviolet Radiation

CHE 55400 - Smart Manufacturing In Process Industries

ECE 50024 - Machine Learning

ECE 50631 - Fundamentals Of Current Flow

ECE 50632 - Introduction To Quantum Transport

ECE 50633 - Boltzmann Law: Physics To Computing

ECE 50863 - Computer Network Systems

ECE 51012 - Electromechanics

ECE 51018 - Hybrid Electric Vehicles

ECE 51032 - Computational Methods For Power System Analysis

ECE 51216 - Digital Systems Design Automation

ECE 51220 - Applied Algorithms

ECE 51300 - Diffraction, Fourier Optics, And Imaging

ECE 52600 - Fundamentals Of MEMS And Micro-Integrated Systems

ECE 53800 - Digital Signal Processing I

ECE 54400 - Digital Communications

ECE 54700 - Introduction To Computer Communication Networks

ECE 55200 - Introduction To Lasers

ECE 55900 - MOS VLSI Design

ECE 59500 - Data Analytics

ECE59500 - Advanced Software Engineering

ECE59500 - CMOS Analog IC Design

ECE59500 - Computer Vision for Embedded Systems

ECE 59500 - Data Analysis, Design of Experiments and Machine Learning

ECE 59500 - Essentials of Transistors

ECE 59500 - Integrated Circuit/MEMS Fabrication Lab

ECE 59500 - Intro to Compilers: Code Generation

ECE 59500 - Intro to Compilers: Compiler Basics

ECE 59500 - Intro to Compilers: Optimization

ECE 59500 - Intro to Data Mining

ECE59500/ME597000 - Intro to Electronics Packaging and Heterogeneous Integration

ECE59500 - Intro to Quantum Science & Tech

ECE 59500 - Intro to the Internet of Things I

ECE 59500 - Intro to the Internet of Things II

ECE 59500 - Intro to the Internet of Things III

ECE 59500 - Introduction to Deep Learning

ECE 59500 - Introduction to Game Theory

ECE59500 - Optical Imaging Systems Design

ECE59500 - Quantum Computing I: Fundamentals

ECE59500 - Quantum Computing II: Hardware

ECE59500 - Quantum Computing III: Algorithm & Software

ECE59500 - Reinforcement Learning Theory

ECE59500 - Semiconductor Fundamentals

ECE 60000 - Random Variables And Signals

ECE 60200 - Lumped System Theory

ECE 60400 - Electromagnetic Field Theory

ECE 60420 - Radio Frequency Integrated Circuits

ECE 60422 - Primer On RF Design

ECE 60423 - RF System Design

ECE 60424 - RF Design: Passive And Active Components

ECE 60600 - Solid State Devices

ECE 60800 - Computational Models And Methods

ECE 60827 - Programmable Accelerator Architectures

ECE 61000 - Energy Conversion

ECE 61010 - Time Domain Simulation And Optimization For Design

ECE 61014 - Electromagnetic And Electromechanical Component Design

ECE 61016 - Power Electronic Converters And Systems

ECE 61700 - Antennas: Design And Applications

ECE 61800 - Numerical Electromagnetics

ECE 63300 - Modeling And Simulation Of Power System Components

ECE 63700 - Digital Image Processing I

ECE 64100 - Digital Image Processing II

ECE 64200 - Information Theory And Source Coding

ECE 68000 - Modern Automatic Control

ECE 68800 - VLSI Testing And Verification

ECE69500 - Advanced IoT Design and Applications

ECE69500 - Big Data for Reliability and Security

ECE69500 - Datacenter & Cloud Networks

ECE69500 - Epidemic Processes

ECE69500 - Fiber Optics Communication

ECE69500 - Flexible and Stretchable Electronics

ECE69500 - High Speed Mixed-Signal IC

ECE69500 - Intro to Math for Systems & Control Theory

ECE69500 - Machine Learning for Bioinformatics and Healthcare

ECE69500 - Nanophotonic Modeling

ECE69500 - Networked Epidemic Processes

ECE69500 - Power Distribution System Analysis

ECE69500 - Quantum Circuits and Systems

ECE69500 - Quantum Detectors & Sensors

ECE69500 - Quantum Detectors

ECE69500 - Quantum Networks

ECE69500 - Stochastic Processes in Information Systems

IE 53500 - Linear Programming

IE 57000 - Manufacturing Process Engineering

IE 57400 - Industrial Robotics And Flexible Assembly

IE 57700 - Human Factors In Engineering

IE 57800 - Applied Ergonomics

IE 57900 - Design And Control Of Production And Manufacturing Systems

IE 59000 - Electromagnetic Robotic Systems

ME 53800 - Air Breathing Propulsion

ME 59700 - Aeroelasticity

ME 59700 - Hybrid Electric Vehicles

ME 59700 - Intro to Electronics Packaging and Heterogeneous Integration.

ME 50000 - Advanced Thermodynamics

ME 50100 - Statistical Thermodynamics

ME 50500 - Intermediate Heat Transfer

ME 50900 - Intermediate Fluid Mechanics

ME 51000 - Gas Dynamics

ME 51100 - Heat Transfer In Electronic Systems

ME 51300 - Engineering Acoustics

ME 51800 - Analysis Of Thermal Systems

ME 52500 - Combustion

ME 53300 - Turbomachinery II

ME 53900 - Introduction To Scientific Machine Learning

ME 55600 - Lubrication, Friction & Wear

ME 55900 - Micromechanics Of Materials

ME 56200 - Advanced Dynamics

ME 56300 - Mechanical Vibrations

ME 57000 - Machine Design

ME 57100 - Reliability Based Design

ME 57500 - Theory And Design Of Control Systems

ME 57700 - Human Motion Kinetics

ME 57800 - Digital Control

ME 57900 - Fourier Methods In Digital Signal Processing

ME 58100 - Numerical Methods In Mechanical Engineering

ME 58700 - Engineering Optics

ME 59500 - Power Storage and Flow

ME 59700 - Complex Fluids

ME 59700 - Fundamentals of Electrochemical Energy Systems

ME 59700 - Solid Mechanics I

ME 59700 - Distributed Energy Resources

ME 60800 - Numerical Methods In Heat, Mass, And Momentum Transfer

ME 61300 - Advanced Engineering Acoustics

ME 61400 - Computational Fluid Dynamics

ME 62000 - Combustion Of Energetic Materials

ME 65000 - Computational Fracture Mechanics

ME 67500 - Multivariable Control System Designs

ME 68100 - Finite And Boundary Element Methods

MSE 51700 - Materials for Hypersonics

MSE 51800 - Failure Analysis

MSE 52000 - Steel and Aluminum Alloys: Processing, Structure And Properties

MSE 52400 - Mechanical Behavior Of Polymers

MSE 52700 - Introduction To Biomaterials

MSE 53000 - Materials Processing In Manufacturing

MSE 53500 - Lean Manufacturing

MSE 56800 - Additive Manufacturing of Materials

MSE 57700 – Materials Science of Rechargeable Batteries

MSE 59700 - Superalloys - High Temperature

MSE 60000 - Materials Engineering Fundamentals

NUCL 50100 - Nuclear Engineering Principles

NUCL 50200 - Nuclear Engineering Systems

NUCL 51000 - Nuclear Reactor Theory I

NUCL 52000 - Radiation Effects And Reactor Materials

NUCL 55100 - Mass, Momentum, And Energy Transfer In Energy Systems

NUCL 57000 - Fuzzy Approaches In Engineering

NUCL 57500 - Neural Computing In Engineering

NUCL 59700 - Big Data and Machine Learning in Engineering

SYS 50000 - Perspectives On Systems

SYS 51000 - Tools And Methodologies For Designing Systems

Skills / Application Courses from the College of Engineering:

AAE 59000 - Space Flight Operations

AAE 69000 - Advanced Aeronautical Engineering Projects

BME 56400 - Ethical Engineering Of Medical Technologies

BME 59500 - Entrepreneurship in BME

CE 59700 - Global Sustainable Engineering

ECE59500 - IP Generation and Management: an Inventor's View

ECE59500 - Stories of Success: From our Alums and Corporate Partners

ECE69500 - Communication for Engineering Leaders

ENE 50101 - Foundations Of Engineering Education

ENE 50200 - History And Philosophy Of Engineering Education

ENE 50300 - Engineering Education Inquiry

ENE 50400 - Leadership, Policy, And Change In Science, Technology, Engineering, And Mathematics (STEM) Education

ENE 50600 - Content, Assessment And Pedagogy: An Integrated Engineering Design Approach

ENE 55400 - Globalization And Engineering

ENE 59500 Career Paths as an Engineering Educator

ENE 68500 - Educational Methods In Engineering

ENE 68700 - Mentored Teaching In Engineering

ENE 69000 - Seminar In Engineering Education

ENE 69500 - Succeeding as an Engineering Professor

IE 54500 - Engineering Economic Analysis

IE 54600 - Economic Decisions In Engineering

IE 55600 - Job Design

IE 55800 - Safety Engineering

IE 56600 - Production Management Control

IE 57000 - Manufacturing Process Engineering

IE 57400 - Industrial Robotics And Flexible Assembly

IE 57700 - Human Factors In Engineering

IE 57800 - Applied Ergonomics

IE 57900 - Design And Control Of Production And Manufacturing Systems

IE 58000 - Systems Simulation

IE 58200 - Advanced Facilities Design

IE 59500 - Human Factors of Medical Devices

IE 59000 - Lean Six Sigma Black

IE 59000 - Big Data Risk Analytics for Engineering Managment and Public Policy

IE 59000 - Electromagnetic Robotic Systems

IE 59000 - Project Management

ME 54100 - Engineering Design: A Decision-Based Perspective

ME 55400 - Intellectual Property For Engineers

ME 69700 - Intelligent Systems

SYS 53000 - Practical Systems Thinking

SYS 59000 - Systems Engineering Processes and Professional Competencies

GRAD 59000 - Program Management: A Comprehensive Overview of the Discipline

Either Category or Electives from the College of Engineering:

BME 55600 - Introduction To Clinical Medicine For Engineering Solutions

BME 56100 - Preclinical And Clinical Study Design

BME 56200 - Regulatory Issues Surrounding Approval Of Biomedical Devices

BME 56300 - Quality Systems For Regulatory Compliance

ECE69500 - Machine Learning for Bioinformatics and Healthcare

ENE 50500 - Theories Of Development And Engineering Thinking

IE 53000 - Quality Control

IE 53300 - Industrial Applications Of Statistics

IE 53500 - Linear Programming

IE 53600 - Stochastic Models In Operations Research I

IE 54500 - Engineering Economic Analysis

IE 54600 - Economic Decisions In Engineering

IE 55600 - Job Design

IE 55800 - Safety Engineering

IE 56600 - Production Management Control

IE 57000 - Manufacturing Process Engineering

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IE 59500 - Human Factors of Medical Devices

IE 59000 - Lean Six Sigma Black

IE 59000 - Big Data Risk Analytics for Engineering Managment and Public Policy

IE 59000 - Electromagnetic Robotic Systems

IE 59000 - Project Management

IE 59000 - Foundations of Secure Development

IE 59000 - Secure Design Lifestyle

IE 59000 - Secure Operations

IE 59000 - Security Applications

MSE 51000 - Microstructural Characterization Techniques