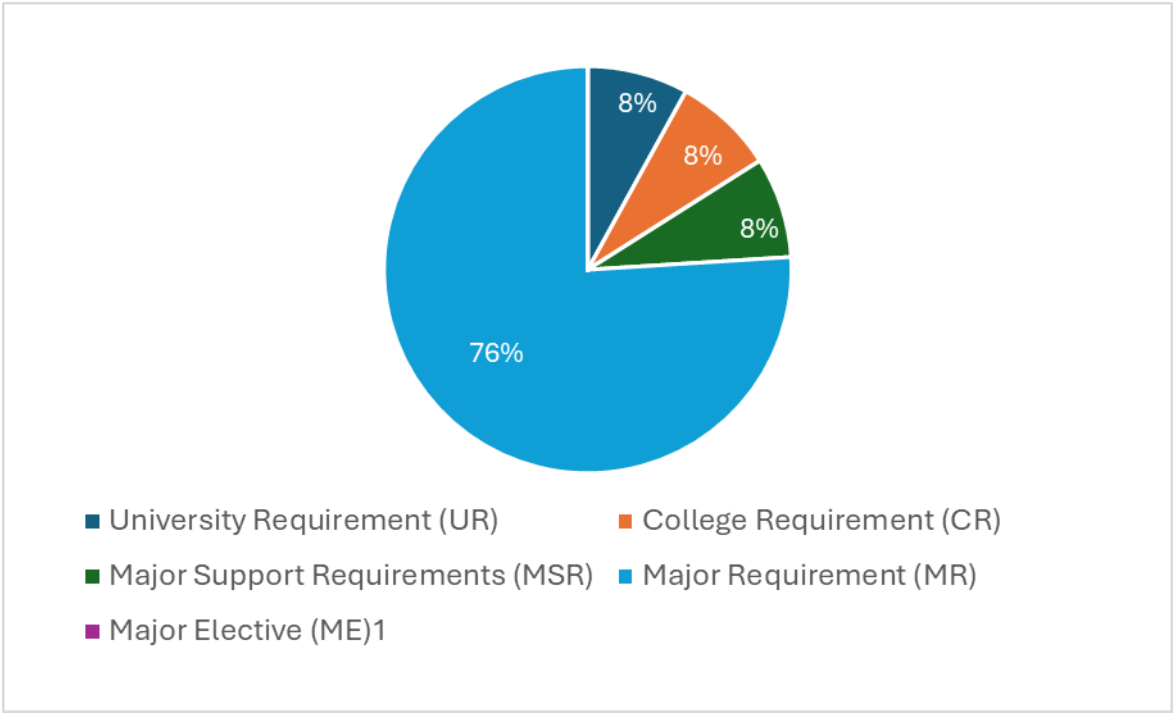
Doctor of Philosophy in Chemical, Civil, Electrical, Electronic, Mechanical Engineering and Engineering Management 2025

Program Components



Course Type	CRD
University Requirement (UR)	6
College Requirement (CR)	6
Major Support Requirements (MSR)	6
Major Requirement (MR)	57
Major Elective (ME)[1]	
Total Credit (CRD)	75

Detailed Study Plan

Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ENGR 701	Advanced Statistics	3	0	3	UR	None	Yes
ENGR 702	Optimization Techniques	3	0	3	MSR	None	Yes
ENGR 703	Doctoral Directed Research	3	0	3	UR	None	Yes
ENGR 704	Advanced Numerical Methods	3	0	3	MSR	None	Yes

Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ENGR 705	Computational Intelligence	3	0	3	CR	None	Yes
ENGR 706	PhD. Pre-Thesis	3	0	3	MR	None	Yes
ENGR 707	Sustainable Development in Engineering	3	0	3	CR	None	Yes

Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ENGR 708A	PhD. Thesis	**0**	**33**	**11**	MR	Completion of 18 credits and ENGR 706	No

Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ENGR 708B	PhD. Thesis	**0**	**33**	**11**	MR	Completion of 18 credits and ENGR 706	No

Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ENGR 708C	PhD. Thesis	**0**	**33**	**11**	MR	Completion of 18 credits and ENGR 706	No

Year 3 - Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ENGR 708D	PhD. Thesis	**0**	**33**	**11**	MR	Completion of 18 credits and ENGR 706	No

Year 4 - Semester 7

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ENGR 708E	PhD. Thesis	**0**	**30**	**10**	MR	Completion of 18 credits and ENGR 706	No

Course Description

Course Code: ENGR 701 **Course Title:** Advanced Statistics

This course aims to develop the skills necessary to identify an appropriate statistical technique, estimate models, analyze data, and interpret results for independent research and to critically evaluate contemporary research using advanced quantitative methods. Descriptive and inference statistics, hypothesis testing, confidence intervals, processing and analysis of research data using different parametric and nonparametric statistical methods, regression analysis for linear and nonlinear models, and the design of experiments. Multivariate Analysis (Multivariate Probability Models, Probability Density Function, Multivariate Data Analysis, Principal Components Analysis). Topics will be demonstrated/implemented using statistical software packages such as SPSS and MATLAB® Statistical toolbox/Minitab®.

Course Code: ENGR 702 **Course Title:** Optimization Techniques

This course aims at introducing mathematical modeling of optimization problems, mathematical programming methods; linear and nonlinear programming; numerical techniques for constrained and unconstrained optimization; Stochastic optimization techniques, and metaheuristics evolutionary algorithms. Methods will be implemented using concurrent coding software.

Course Code: ENGR 703 **Course Title:** Doctoral Directed Research

This course aims to provide students with the necessary skills to analyze literature and research papers relevant to their selected PhD research areas. The focus is on conducting a comprehensive and overview of recent developments, establishing a robust basis for the literature review essential to their PhD theses. Additionally, students initiate the investigation of methodologies and begin developing models for their selected research topics. Mechanism: Can be taught by more than on instructor based on the specialization and the intake

Course Code: ENGR 704 **Course Title:** Advanced Numerical Methods

This course aims at covering advanced methods for numerical analysis. It briefs introduction to numerical computing, approximation and errors which is followed by methods of solving system of nonlinear equations and approximation of function. Numerical solutions of ordinary differential equation; initial value problems and boundary value problems, simultaneous differential equation, Runga-Kutta methods, finite difference method. Numerical solution techniques for linear, elliptic, parabolic and hyperbolic partial differential equations. Introduction to the some theoretical basics and practical applications of the finite element method in engineering. Methods will be implemented using concurrent coding software.

Course Code: ENGR 705 **Course Title:** Computational Intelligence

This course provides a concise introduction to machine learning (ML) and artificial intelligence (AI) fundamentals, covering key concepts and practical applications. Students explore supervised, unsupervised, and reinforcement learning techniques, alongside feature engineering and selection. Topics include classification, regression, and algorithms like k-Nearest Neighbors, decision trees, and support vector machines. Unsupervised learning covers dimensionality reduction, clustering, and neural network architectures, including Convolutional Neural Networks (CNNs) and Sequential Neural Networks. (RNNs). Applications on selected topics in engineering.

Course Code: ENGR 706 **Course Title:** PhD. Pre-Thesis

This course prepares doctoral graduate students for their dissertation research. It covers research methodology, including qualitative and quantitative methods, literature reviews, hypothesis formulation, and research proposal preparation. The course also emphasizes reading and seminar activities to enhance students' understanding of contemporary issues in their field of specialization. Additionally, students undergo a research proposal examination where they present and defend their comprehensive thesis proposals.

Code: ENGR 707 **Course Title:** Sustainable Development in Engineering

This course provides students with a comprehensive understanding of sustainability principles and their integration into engineering practice. Covering topics such as environmental systems, life cycle assessment, sustainable infrastructure, renewable energy, and policy analysis, the course equips students with the knowledge and skills needed to address complex sustainability challenges. Through case studies and practical applications, students learn to evaluate environmental and social impacts, identify opportunities for sustainable innovation, and contribute to the development of solutions that promote the triple bottom line of economic prosperity, social equity, and environmental stewardship.

Code: ENGR 708 **Course Title:** PhD. Thesis

The PhD Dissertation course offers students the opportunity to engage in rigorous analysis of a specific engineering topic or research problem within their field. Building upon the research proposal developed in the pre-Dissertation course, students will conduct comprehensive research, gather and analyze data, and ultimately submit their final dissertation. Students are expected to produce a final dissertation that demonstrates originality, creativity, and significant contributions to their chosen topic area.