Industrial Engineering Program

at

College of Engineering

Northern Border University

Arar, Kingdom of Saudi Arabia

September 2023

TRIMESTER CURRICULAR PLAN

1. UNIVERSITY REQUIREMENTS

a. Obligatory University Courses

No.	Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1	1601-101	Islamic Culture 1	---	2	3
2	1601-201	Islamic Culture 2	---	2	3
3	1602-101	Arabic Language	---	2	3
			Total Credit Hours	**6**	**9**

b. Elective University Courses (2 from 6)

No.	Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1	1601-301	Islamic Culture 3	---	2	3
2	1601-302	Islamic Culture 4	---	2	3
3	1601-303	Islamic Culture 5	---	2	3
4	1601-401	Islamic Culture 6	---	2	3
5	1601-402	Islamic Culture 7	---	2	3
6	1601-403	Islamic Culture 8	---	2	3
			Total Credit Hours	**4**	**6**

2. COLLEGE REQUIREMENTS

a. Obligatory College Courses

No.	Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1	1606-114	Reading I	---	2	3
2	1101-101	General Physics 1	---	4	9
3	1104-111	Engineering Mathematics I	---	4	7.5
4	1104-212	Engineering Mathematics II	1104-111	4	7.5
5	1104-313	Engineering Mathematics III	1104-212	4	7.5
6	1104-314	Engineering Mathematics IV	1104-111	3	6
7	1402-300	Numerical Methods in Engineering	1104-313	3	6
8	1403-101	Engineering Drawing	---	3	9
9	1403-111	Basic Workshop	1403-101	2	6
10	1405-101	Introduction to Engineering Design	---	2	4.5
11	1405-202	Engineering Economy	1104-111	2	3
12	1405-203	Engineering Management	---	2	3
13	1405-204	Probability and Statistics	1104-212	3	4.5
14	1405-405	Engineering Ethics	---	1	1.5
			Total Credit Hours	**39**	**78**

3. PROGRAM REQUIREMENTS

a. Obligatory Program Courses

No.	Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1	1405211	Engineering Mechanics	1101101	3	7.5
2	1405212	Materials Engineering	---	3	7.5
3	1405221	Applied Engineering Statistics	1405204	3	6
4	1405313	Manufacturing Technology	1405212 & 1403111	3	7.5
5	1405323	Design of Industrial Information Systems	---	3	7.5
6	1405322	Operations Research I	1104314	3	6
7	1405331	Production Planning and control	1405203	3	6
8	1405341	Work Systems Analysis and Design	1405221	3	7.5
9	1405314	Control & Automation	1104313	3	7.5
10	1405332	Facilities Planning and Design	1405203 & 1405322	3	6
11	1405342	Human Factors Engineering	1405221	3	7.5
12	1405324	Operations Research II	1405322	3	6
13	1405498	B.SC. Project I	96 CH & Dept. Apr.	1	3
14	1405415	Computer Integrated Manufacturing	1405314	3	7.5
15	1405433	Industrial Quality Control	1405221	3	7.5
16	1405416	Manufacturing Economics	1405202	3	4.5
17	1405425	Simulation of Industrial Systems	1405324	3	7.5
18	1405499	B.SC. Project II	1405498	3	4.5
19	1405406	Special Topics in IE	Dept. Apr.	2	4.5
20	1405443	Industrial Safety Engineering	1405342	3	4.5
			Total Credit Hours	**57**	**126**

b. Obligatory Program Courses (From Outside the department)

No.	Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1	1606110	Writing (I)		2	3
2	1606111	Writing (II)	1606110	2	3
3	1102101	General Chemistry 1		4	9
4	1101202	General Physics 2	1101101	4	9
5	1402207	Basic of Electrical Engineering	---	3	6
6	1402221	Object Oriented Computer Programming	---	3	6
			Total Credit Hours	**18**	**36**

c. Elective Program Courses (3 courses with 9 Credit Hours)

No.	Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1	1405407	Introduction to Entrepreneurship	1405203	3	4.5
2	1405417	Material Handling and Packaging	1405314	3	4.5
3	1405418	Product Design and Development	1405314	3	6
4	1405426	Decision Analysis	1405324	3	4.5
5	1405327	Network Analysis	1405324	3	4.5
6	1405428	Queuing Systems	1405324	3	4.5
7	1405434	Lean Manufacturing and services	1405331	3	4.5
8	1405435	Maintenance and replacement policies	1405221	3	4.5
9	1405436	Project Management	1405203	3	4.5
10	1405437	Reliability Engineering	1405324	3	6
11	1405438	Supply chain management	1405331	3	4.5
12	1405444	Industrial Environmental Engineering	1405342	3	4.5
13	1405445	Industrial Hygiene Engineering	1405443	3	4.5
			Total Credit Hours	**9**	**13.5-16.5**

d. Field Training

The student spending 8 weeks at the training on-site in a manufacturing or service industry, 5 days a week and 6 hours per day with a total number of hours 240 hours.

No.	Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1	1405391	Summer Training	90 C.H. & Dept. Appr.	2	240
			Total Credit Hours	**2**	**240***

*The contact hours from summer training are distinct in nature and type from regular course hours, and will not be summed together with the other contact hours.

TYPICAL STUDY PLAN

Year 1/ Term 1

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1101101	General Physics I	---	4	9
1104111	Engineering Mathematics 1	---	4	7.5
1403101	Engineering Drawing	---	3	9
		Total Credit Hours	**11**	**25.5**

Year 1/ Term 2

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1405101	Introduction to Engineering Design	---	2	4.5
1601101	Islamic Culture 1	---	2	3
1606114	Reading (I)	---	2	3
1403111	Basic Workshop	1403101	2	6
1104212	Engineering Mathematics II	1104111	4	7.5
		Total Credit Hours	**12**	**24**

Year 1/ Term 3

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1102101	General Chemistry (I)	---	4	9
1101202	General Physics 2	1101101	4	9
1606110	Writing 1	---	2	3
		Total Credit Hours	**10**	**21**

Year 2/ Term 4

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1104313	Engineering Mathematics III	1104212	4	7.5
1405202	Engineering Economy	1104111	2	3
1405203	Engineering Management	---	2	3
1405204	Probability and Statistics	1104-212	3	4.5
		Total Credit Hours	**11**	**18**

Year 2/ Term 5

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1405211	Engineering Mechanics	1101101	3	7.5
1606111	Writing II	1606110	2	3
1405221	Applied Engineering Statistics	1405204	3	6
1602101	Arabic language 1	---	2	3
		Total Credit Hours	**10**	**19.5**

Year 2/ Term 6

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1402207	Basic Elect. Engineering	---	3	6
1104314	Engineering Mathematics IV	1104111	3	6
1405212	Materials Engineering	---	3	7.5
1402221	Object-Oriented Computer Programming	---	3	6
		Total Credit Hours	**12**	**25.5**

Year 3/ Term 7

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1405313	Manufacturing Technology	1403111 & 1405212	3	7.5
1402300	Numerical Methods in Engineering	1104313	3	6
1405323	Design of Industrial Information Systems	---	3	7.5
1405322	Operations Research I	1104314	3	6
		Total Credit Hours	**12**	**27**

Year 3/ Term 8

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1601201	Islamic Culture 2	---	2	3
1405331	Production Planning and control	1405203	3	6
1405341	Work Systems Analysis and Design	1405221	3	7.5
1405314	Control & Automation	1104313	3	7.5
		Total Credit Hours	**11**	**24**

Year 3/ Term 9

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1601xxx	Elective (1) Islamic Culture 3	---	2	3
1405332	Facilities Planning and Design	1405203 & 1405322	3	6
1405342	Human Factors engineering	1405221	3	7.5
1405324	Operations Research II	1405322	3	6
		Total Credit Hours	**11**	**22.5**

Summer Term

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1405391	Summer Training	90 C.H. & Dept. Appr.	2	240
		Total Credit Hours	**2**	**240***

*The contact hours from summer training are distinct in nature and type from regular course hours, and will not be summed together with the other contact hours.

Year 4/ Term 10

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1405498	B.SC. Project I	96 C.H. & Dept. App.	1	3
1405415	Computer Integrated Manufacturing	1405314	3	7.5
1405405	Engineering Ethics	---	1	1.5
1405xxx (1)	IE Elective (1)	*	3	4.5
1405433	Industrial Quality Control	1405221	3	7.5
		Total Credit Hours	**11**	**24**

Year 4/ Term 11

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1405416	Manufacturing Economics	1405202	3	4.5
1405425	Simulation of Industrial Systems	1405324	3	7.5
1405xxx	IE Elective (2)	*	3	4.5
1405499	B.SC. Project II	1405498	3	4.5
		Total Credit Hours	**12**	**21**

(*) The prerequisites for elective courses vary depending on each individual course.

Year 4/ Term 12

Course Number	Course Title	Prerequisites	Credit Hours	Contact Hours
1405443	Industrial Safety Engineering	1405342	3	4.5
1601xxx	Elective (2) Islamic Culture	---	2	3
1405406	Special Topics in IE	Dept.. Appr.	2	4.5
1405xxx	IE Elective (3)	*	3	4.5
		Total Credit Hours	**10**	**16.5**

(*) The prerequisites for elective courses vary depending on each individual course.

BRIEF COURSE DESCRIPTIONS

A - REQUIRED COURSES FROM IE DEPARTMENT		
1	**1405101 - Introduction to Engineering Design**	**(2, 3)**
	This course introduces to the engineering students the basic concepts required for solving real engineering problem by using creative methods. Teamwork tools and skills. Characteristics, environment, and skills necessary for effective problem solving. Problem solving heuristics: Problem definition, Generating solutions, Deciding the course of actions, Implementing the solution, Evaluating the solution. Real- Life problem solving.	
2	**1405202 - Engineering Economy**	**(2, 3)**
	Engineering Economy covers various topics, including the time value of money, interest rates, present worth, future worth, annual worth, equivalent uniform annual cost, benefit-cost analysis, and risk analysis. Throughout the course, students will acquire the necessary skills to analyze cash flow series, evaluate different alternatives, allocate costs and capital budgets, and assess the impact of depreciation and inflation on engineering investments. By applying these concepts, students will develop problem-solving abilities specific to engineering contexts. Moreover, they will learn to critically evaluate the economic feasibility of engineering projects. In Engineering Economy, students will gain a comprehensive understanding of the financial aspects associated with engineering decision making. The course provides a solid foundation for students to apply economic analysis techniques to real-world engineering scenarios.	
3	**1405203 - Engineering Management**	**(2, 3)**
	This course introduces engineering management and technology management. Topics covered include the historical development of industrial management, introductory operations management, functions of technology management, planning production activities and managing engineering projects.	
4	**1405-211: Engineering Mechanics**	**(3, 7.5)**
	This course provides students with the fundamentals of Engineering Mechanics, determine moment of forces, analyze rigid body motion, determine velocities and accelerations and Use impulse and momentum principles to determine velocities.	
5	**1405-204 - Probability and Statistics**	**(3, 4.5)**
	This course introduces statistics and data description, probability theory, random variables and probability distributions, mathematical expectation, essential discrete and continuous random variables, fundamental sampling distributions, and data analysis techniques for one- and two-sample estimation problems.	
6	**1405-221: Applied Engineering Statistics**	**(3, 6)**
	Students will learn to conduct and complete parameter estimation, confidence intervals, statistical inference (Hypothesis testing), nonparametric tests, simple linear regression and correlation, multiple linear regression, analysis of variance (ANOVA) (two factors) and Design of Experiments (DOE) for n sample and n factors.	
7	**1405-212: Materials Engineering**	**(3, 7.5)**
	In this course the students will have the opportunity to learn something about the basic materials science and the fundamentals of the structure/property's relationships of all types of materials (metals and their alloys, ceramics, polymers and composites)	
8	**1405-313: Manufacturing Technology**	**(3, 7.5)**
	The students will obtain knowledge of engineering materials. Conventional manufacturing processes: Solidification processes, Sheet metal forming. Material removal processes, Joining and assembly processes. Non-conventional manufacturing processes.	

9	**1405-322: Operations Research I**	**(3, 6)**
	This course is designed to provide an understanding of the concepts of operations research problems. In addition, the course is to introduce the students how to formulate the linear programming models, the different approaches to solve the linear programming models including graphical model, simplex algorithm. Furthermore, this course is to concentrate on the assignment and transportation, integer and goal programming models	
10	**1405-331: Production Planning and Control**	**(3, 6)**
	Production Planning and Control is a study of the concepts, principles, problems, and procedures involved in managing manufacturing processes. This course is to introduce students to the important issues managers face in planning, controlling, and managing operations and supply chains. The focus will be placed on discussions of various types of production systems and several techniques commonly used for production planning and control. The students will also be exposed to selected models for the analysis and replenishment of inventories. And, will be introduced to, aggregate planning, operations strategy, capacity planning, supply-chain management, just-in-time systems, lean manufacturing, Materials Requirement Planning (MRP), Enterprise Resource Planning (ERP), short-term scheduling and sequencing, lean Production and Supply Chain Management.	
11	**1405-341: Work System Analysis and Design**	**(3, 7.5)**
	This course is designed to teach the fundamentals of work study, which is used in the examination of work in all their contexts. The topics covered in the course are introduction, problem solving tools (recording and analysis tools, activity charts, line balancing), operation analysis, manual work design (principles of motion economy, motion study), time study (performance rating and allowances), standard data and formulas, work sampling, predetermined time systems.	
12	**1405-314: Control and Automation**	**(3,7.5)**
	This course introduces an introduction to linear feedback control theory, mathematical modeling of physical systems, transfer functions, block diagrams, and signal flow graphs, time-domain analysis of control systems, test signals, transient response, time domain specifications, steady-state error, and stability. The course also covers sensors, actuators, A/D and D/A conversion, hydraulic and pneumatic systems, Programmable Logic Controllers (PLCs), and Computer Integrated Manufacturing (CIM).	
13	**1405-323: Design of Industrial Information Systems**	**(3, 7.5)**
	This course is intended to engage students in analyzing and designing solutions to information systems problems related to industrial information systems. This includes industrial information systems planning and project identification and selection, how to construct a database, user interface and reports to summarize data database analysis and design and the human-computer interface and implementation.	
14	**1405-332: Facilities Planning and Design**	**(3, 6)**
	This course introduces the Fundamentals of facilities planning. Facilities design. Flow, space, and activity relationships. Material handling systems. Layout planning models. Warehouse operations. Quantitative facilities planning models. Preparing,	
15	**1405-342: Human Factors Engineering**	**(3, 7.5)**
	This course introduces ergonomics, which focuses on analyses of work and its environmental circumstances in an industrial engineering discipline. During the course, basic concepts of ergonomics such as the human body, human mind as well as human senses will be discussed. Based on this knowledge, one of the main goals of this course is to design an environment that is in interaction with humans.	
16	**1405-324: Operations Research II**	**(3, 6)**
	This course is a continuation for operations research I. Topics include non-linear programming, dynamic programming, waiting line models, Markov analysis, introduction to game theory and some industrial applications. This course aims to introduce students to some advanced operations research topics with their applications in industrial, service and public systems.	

17	**1405-391: Summer Training**	**(2, 240*)**
	This training provides an opportunity to expose students to the reality of professional practice. Students are required to spend 08 weeks in training on-site in a manufacturing or service industry under the supervision of an industry-based advisor. Students are required to submit a report presenting details of the work undertaken and the documentation used during the training. Students are encouraged to use multimedia during the presentation of their work.	
18	**1405-498: B.Sc. Design Project I**	**(1, 3)**
	In Capstone Design Project 1 course, students collaborate in teams to address complex engineering problems using industrial engineering principles. The course focuses on the complete design process, from problem identification to evaluating design alternatives. Throughout the course, students engage in problem identification through research, analysis, and brainstorming. They generate multiple design alternatives and evaluate them against specified criteria, enabling them to make informed decisions for further development in Capstone Design Project 2. Students learn to tackle technical challenges while considering diverse stakeholder perspectives and integrating various constraints, such as safety, sustainability, and public welfare. They apply engineering knowledge and scientific principles to develop solutions that meet specified needs. Utilize project management techniques to plan, execute, and monitor the progress of design projects, ensuring efficient resource utilization and timeline adherence.	
19	**1405-415: Computer Integrated Manufacturing System**	**(3, 7.5)**
	This course is designed for introducing the students to the state-of-the-art concepts in computer integrated manufacturing systems. The course will cover the fundamentals of manufacturing technologies and automation. The students will work on Lab assignments using the available hardware and software in teams of two-three students. Lab assignments will include CAD/CAM integration, flexible manufacturing system and robot programming.	
20	**1405-405: Engineering Ethics**	**(1, 1.5)**
	This course introduces engineering professionalism and ethics. Students will learn about codes of ethics and professional conduct in various engineering disciplines, including NSPE, IEEE, AIChE, ASCE, ASME, and ACM-IEEE/CS. The course will explore the ethical responsibilities of engineers, including their commitment to safety, honesty, and environmental ethics. Students will also examine the role of engineering in social experimentation and in addressing global issues. Workplace responsibilities and rights will be discussed, along with the impact of technological progress on society. Through case studies and ethical dilemmas, students will develop critical thinking skills to identify and analyze ethical issues that arise in engineering practice. By the end of the course, students will be able to apply ethical principles to real-world engineering scenarios and make informed ethical decisions.	
21	**1405-433: Industrial Quality Control**	**(3, 7.5)**
	This course provides students with basic coverage of topics in quality engineering and introduces them to quality management concepts and their use in enhancing organizational performance and profitability. It provides comprehensive coverage of the use of modern techniques for quality control and improvement and gives special focus on the design of statistical quality problem-solving methodologies used to reduce process variability. Control charts for variables and attributes, process capability analysis, specification and tolerances, and acceptance sampling plans, are among the topics discussed in this course.	
22	**1405-416: Manufacturing Economics**	**(3, 3)**
	This course is designed to provide an understanding of traditional and contemporary product costing and pricing methods (Examination of the accounting practices to record and control material, labor, and overhead costs, and Activity Based Costing (ABC)). In addition to break-even analysis, cost-benefit analysis, performance measurement, and companies' financial statements. Also include analysis of variance for standard costs. In addition, the course explores the uses of costing techniques and practices for various types of management decisions.	

23	**1405-425: Industrial Systems Simulation**	**(3, 7.5)**
	In this course, students will learn the processes, tools, and techniques for performing effective simulation analyses, specifically: the basic underlying principles of how simulations work, how to collect and analyze input data, how to build basic simulation models using ARENA, how to verify and validate simulation models, and how to interpret and perform statistical analyses of simulation output.	
24	**1405-499: B.Sc. Design Project II**	**(3, 3)**
	Capstone design project II is a course that builds upon the knowledge and skills developed in Capstone design project I, and provides students with an opportunity to apply advanced engineering principles and methodologies to design and implement solutions for complex industrial engineering problems. Students will utilize appropriate testing and validation techniques to assess the performance and functionality of the designed solution, and continuously evaluate and improve the design implementation through feedback, data analysis, and iterative optimization. By the end of Capstone Design Project II, students will have gained valuable experience in tackling complex industrial engineering challenges, further developed their problem-solving and decision-making abilities, honed their communication skills, and deepened their understanding of ethical and professional responsibilities in design implementation and evaluation.	
25	**1405-406: Special Topics in Industrial Engineering**	**(2, 4.5)**
	This course is designed to provide a flexible topics course across several domains in the field of Industrial Engineering. The aim of this course is to introduce students to new relevant industrial engineering topics that have not covered in depth in other courses of the program.	
26	**1405-443: Industrial Safety Engineering**	**(3, 4.5)**
	This course will provide students with tools and guidelines to become safety engineers or managers in real world industries. It emphasizes on national and international safety regulations and standards, industrial hazard avoidance concepts and techniques, accident losses and its effect on organizations and the national economy, workers' compensation, and developing and maintaining safety programs, plant safety applications, management and its safety responsibilities, and emergency planning.	

B – ELECTIVE COURSES FROM IE DEPARTMENT		
1	**1405-407: Introduction to Entrepreneurship**	**(3. 4.5)**
	This course offers the basic framework for understanding the process of entrepreneurship, principles of management and related techniques in decision making, planning, marketing, and financial control. Exercises in product design and prototype development, preparation of workable project feasibility reports, practical ideas about launching their own enterprises are also covered.	
2	**1405-426: Decision Analysis**	**(3. 4.5)**
	The course aims to build the students' ability to understand the principles of decision making and methods for decision analysis under uncertainty to apply them in industrial areas. It creates an understanding to appreciate the use of expert judgment and the value of information in decision making and risk management. It is a design function to consider constraints, Solutions, and analysis of decision problems.	
3	**1405-428: Queuing Systems**	**(3. 4.5)**
	The course introduces students to "Queuing System" characteristic and notation, birth-death Markovian models, single and multiple servers, advanced Markovian models and their issues, non-Markovian models, queuing networks, the measure of effectiveness and optimization problems in queuing and solving case studies using numerical and simulation techniques.	
4	**1405-434: Lean Manufacturing and services**	**(3. 4.5)**
	This course attempts to provide students with the knowledge and practical skills to systematically analyze, develop, evaluate and deploy technical issues of Lean Manufacturing and Services; and understands the process that can run using less material, requiring less investment, using less inventory, consuming less space, and using fewer people.	
5	**1405-435: Maintenance and replacement policies**	**(3. 4.5)**
	This course presents; on the one hand, the Fundamentals of Industrial Maintenance, Maintenance Techniques: Infrared Thermography, Oil Analysis, Vibration Analysis... as well as Maintenance Methods: Total Productive Maintenance (TPM), FMEAC, SMED, 5S... On the other hand, an introduction to the life cycle costing concept for equipment acquisition, operation, and replacement decision-making. Designing for reliability and determination of optimal maintenance and replacement policies for both capital equipment and components. Topics include identification of an item's failure distribution and reliability function, reliability of series, parallel, and redundant systems design configurations, time-to-repair and maintainability function, age and block replacement policies for components, the economic life for capital equipment, provisioning of spare parts.	
6	**1405-437: Reliability Engineering**	**(3. 6)**
	This course introduces the introduction to reliability theory, The Failure Distribution, Constant Failure Rate Model, Time-Dependent Failure Models, Reliability of Systems, State Dependent Systems, Design for Reliability, Maintainability, Design for Maintainability, Availability, Data Collection and Empirical Methods, Reliability Testing, Goodness-of-Fit Tests, Introduction to fault tree analysis.	
7	**1405-438: Supply Chain Management**	**(3. 4.5)**
	This course is intended to introduce students to supply chain management including its history, purpose, general principles, career opportunities, and its interrelationships with other functional areas of businesses. It is also intended to introduce standard terms and concepts for communications with supply chain personnel. This course teaches concepts useful in efficiently managing Supply Chains. Topics covered include: the role of Supply Chain Management in overall competitive strategy, terms, definitions, Supply Chain examples, key performance measures, and tools for improving Supply Chain performance. The level of discussion varies from long-term strategic planning to daily control of Supply Chain & business processes.	

8	**1405-444: Industrial Environmental Engineering**	**(3. 4.5)**
	This course is designed to introduce students to the basics of natural systems, industrial environment as part of the ecological system, water quality management, waste water treatment, air pollution, noise pollution, solid waste management, hazardous waste management and ionizing radiation.	
9	**1405-445: Industrial Hygiene Engineering**	**(3. 4.5)**
	This course introduces the methods used by industrial hygienists to control occupational diseases. It covers the physical form of air contaminants, air sampling and analysis, engineering controls, and the preparation of survey protocols that uses the concepts of the natural sciences and mathematics, and effective public-health management.	
10	**1405-436: Project Management**	**(3. 4.5)**
	This course provides a comprehensive overview of engineering project management, covering all aspects of the project life cycle from inception to completion. Students will learn how to plan, implement, and manage successful projects, including the processes of budgeting, scheduling, and resource allocation. The course will cover project network tools for project planning and monitoring, cost optimization techniques to meet project objectives, project crashing, time-cost trade-offs, and risk analysis.	

C - REQUIRED COURSES FROM OTHER ENGINEERING DEPARTMENTS		
1	**1403-101 Engineering Drawing**	**(3, 9)**
	Introduction: Skills of freehand sketching. Methods of projection: orthographic, isometric. Dimensioning of views. Third view prediction. Primary and successive auxiliary views. Intersections of surfaces and bodies. Sectioning.	
2	**1403-111 Basic Workshop**	**(2, 6)**
	Introduction to manufacturing processes. Workshop safety. Engineering materials. Workshop measurements. Bench work. Sand casting process. Metal forming processes and sheet metal working. Metal cutting processes. Joining of materials.	
3	**1402207: Basic Electrical Engineering**	**(3, 6)**
	This course is presented in the following order: the basic definitions of electric quantities; Ohm's and Kirchhoff's laws as well as nodal analysis in DC circuits and AC circuits; series and parallel network; three-phase circuits; Introduction in single phase transformer; introduction in DC machines; introduction in AC machines.	
4	**1402-221: Object-oriented computer programming**	**(3, 6)**
	This course presents a conceptual and practical introduction to imperative and object-oriented programming, exemplified by C++. As well as providing grounding in the use of C++, the course will cover general principles of programming.	
5	**1402300: Numerical Methods in Engineering**	**(3, 6)**
	This course covers the concepts and techniques for numerical methods and algorithms, Solution of non-linear equations- solution of large systems of linear equations, Interpolation, Curve fitting, Numerical differentiation and integration, Solution of differential equations.	

D - REQUIRED COURSES FROM OTHER COLLEGES		
1	**1104111: Engineering Mathematics I**	**(4, 7.5)**
	This course is considered as a first course in differential calculus, dealing mainly with differentiations of elementary functions and their applications.	
2	**1606114: Reading I**	**(2, 3)**
	This course aims at developing students' reading strategies and skills in English at the basic level. It will address the following skills and strategies: mechanics of reading, reading techniques, vocabulary skills and extracting general information.	
3	**1104212: Engineering Mathematics II**	**(4, 7.5)**
	This course is mainly dealing with integral calculus, including the following topics: Inverse functions, inverse trigonometric and hyperbolic functions and their derivatives, L'Hopital's rule, The indefinite integral, methods of integration (substitutions, parts, trigonometric substitutions, partial fractions …). The definite integral, the fundamental theorem of calculus. Applications of definite integral (Area between two curves, volumes, length of a plane curve, area of a surface of revolution …).	
4	**1102101: General Chemistry 1**	**(4, 9)**
	Introduction to the general principles of chemistry for students planning a professional career in chemistry, a related science, the health professions, or engineering. The SI units, the chemical formula, Naming covalent and ionic compounds, Stoichiometry, Atomic structure, Electron configuration, Periodic table, Chemical bonding, Gases, Chemical equilibrium, Acids and Bases, Organic chemistry and Biochemistry chemistry. Weekly laboratory experiments aiming the safety rules in chemistry lab. and identify the main inorganic acidic and basic radicals based on specific qualitative tests. Weekly discussion sessions focus on homework assignments and lecture material.	
5	**1101101: General Physics I**	**(4, 9)**
	Study of units and dimensions. Study of vectors and their properties. Motion in different dimensions and projectile motion. Newton's laws with examples involving friction force or without friction force. The study of kinetic and potential energy conservation and the calculation of work and power. Elastic and inelastic collision and the difference between them. The study rigid body rotation. Lab Experiments: Simple pendulum, Verification of Newton's 2nd law, Static and kinetic friction, Projectile motion, Hook's law, Free fall, Force balance table, Rotational motion.	
6	**1101202: General Physics 2**	**(4, 9)**
	The course is interested in the study of the principles of electricity and magnetism. The course provides the students to the fundamentals of electric charge, electric force, electric field, electric potential, magnetic field, magnetic force, capacitors and dielectrics.	
7	**1104313: Engineering Mathematics III**	**(4, 7.5)**
	The topics covered include ordinary differential equations and some methods to solve them.	
8	**1606110 Writing I**	**(2, 3)**
	This course acquaints students with the process of writing basic sentences using proper spelling, grammar, punctuation, and structure. Students will be exposed to the process of combining sentences into simple paragraphs.	
9	**1606111: Writing II**	**(2, 3)**
	This course further develops students' skills in paragraph writing. Students will edit and review paragraphs to identify mistakes. Students will progress to writing multi-paragraph essays with a clear introduction and development of ideas.	
10	**1104314: Engineering Mathematics IV**	**(3, 6)**
	The course typically begins with an introduction to vectors and vector spaces, including concepts such as linear independence, basis, and dimension. Then, students learn about linear transformations and matrices, including topics such as matrix multiplication, inverses, and determinants.	