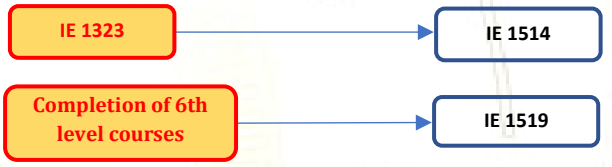
Department of Industrial Engineering
College of Engineering
Imam Mohammad Ibn Saud Islamic University
Riyadh, Kingdom of Saudi Arabia
Industrial Engineering Program 1447 [Required Credits = 156]
University Courses 20 + 6 Credits
Math. & Basic Sciences 33 Credits
Engineering Fundamentals 20 + 3 Credits
Engineering Depths 64 + 6 + 4 Credits
FIRST YEAR (Foundation) FALL(1) SPRING(2)
QUR 1001 [2] Quran Kareem
UNI 1001 [2] Elective Univ 2 from Package 1
MAT 1122 [3] Pre-Calculus
PHY 1117 [3] Physics I
PHY 1119 [1] Physics I Lab CO: PHYS 1117
GE 1103 [3] Engineering Graphics and Design
ENG 1120 [3] Technical Writing in English
UNI 1002 [2] Elective Univ 3 from Package 2
UNI 1003 [2] Elective Univ 4 from Package 2
UNI 1004 [2] Elective Univ 5 from Package 3
MAT 1115 [3] Calculus I PRE: MAT 1122
PHYS 1118 [3] Physics II PRE: PHY 1117, PHY 1119
PHY 1120 [1] Physics II Lab CO: PHY 1118
CHM 1104 [3] General Chemistry
CHM 1105 [1] General Chemistry Lab CO: CHEM 1104
GE 1101 [0] Engineering Reports PRE: ENG 1120
[9 / 17]
SECOND YEAR (SOPHOMORE) FALL(3) SPRING(4)
UNI 1005 [2] Elective Univ 6 from Package 3
ARB 1001 [2] Linguistic Skills Univ course Package 4
MAT 1116 [3] Calculus II PRE: MAT 1115
STA 1215 [3] Probability and Statistics for Engineers PRE: MAT 1115
GE 1108 [3] Programming for Engineers PRE: MAT 1115
ME 1111 [3] Materials Science and Engineering PRE: MAT 1115, CHM 1104
IE 1201 [0] Introduction to Industrial Engineering
UNI 1007 [2] Elective Univ 8 from Package 4
MAT 1207 [3] Calculus III PRE: MAT 1116
MAT 1228 [3] Linear Algebra & Ordinary Differential Equations PRE: MAT 1116
GE 1201 [3] Statics PRE: MAT 1116, PHY 1117
GE 1305 [3] Fundamentals of Electrical Eng. PRE: MAT 1116, PHY 1118, PHY 1120
IE 1211 [3] Engineering Experiment Design PRE: MAT 1116, STA 1215
[7 / 16]
[6 / 17]
THIRD YEAR (JUNIOR) FALL(5) SPRING(6)
UNI 1008 [2] Elective Univ 9 from Package 5
FRC 1001 [2] Free Course 1
MAT 1236 [3] Mathematical Methods for Engineers PRE: MAT 1207, MAT 1228
IE 1314 [1] Manufacturing Processes Lab CO: IE 1315
IE 1315 [3] Manufacturing Processes PRE: ME 1111, GE 1201
IE 1325 [3] Engineering Management PRE: STA 1215
IE 1335 [3] Operations Research I PRE: STA 1215
FRC 1002 [2] Free Course 2
IE 1301 [3] Quantitative Solutions for IE Applications PRE: MAT 1236, GE 1108
IE 1322 [3] Facilities Design and Materials Handling PRE: IE 1335
IE 1323 [3] Quality Control PRE: STA 1215
IE 1331 [3] Production Planning and Inventory Control PRE: STA 1215
IE 1336 [3] Operations Research II PRE: IE 1335
[7 / 17]
[6 / 17]
Exit Point – Advanced Diploma in Industrial Engineering
Completion of 72
FOURTH YEAR (SENIOR) FALL(7) SPRING(8)
FRC 1003 [2] Free Course 3
GE 1403 [3] Engineering Economy PRE: MAT 1236
IE 1412 [3] Reliability and Maintenance PRE: MAT 1236, STA 1215
IE 1415 [3] Computer Integrated Manuf. and Automation PRE: IE 1315
IE 1416 [3] Industrial Ergonomics
IE 1417 [3] Simulation Modeling and Analysis PRE: IE 1335
UNI 1009 [2] Elective Univ 10 from Package 5
GE 1401 [3] Project Management PRE: STA 1215
IE 1411 [3] Work Processes and Design PRE: IE 1416
IE 1428 [3] Production Systems PRE: IE 1301, IE 1335
IE 1431 [3] Logistics and Supply Chain PRE: IE 1331
IE 1493 [3] Graduation Project I PRE: Complete 117 CrH.
[6 / 17]
[6 / 17]
FIFTH YEAR FALL(9) SPRING(10)
GE 1402 [2] Professional Ethics for Engineers PRE: GE 1403
IE 1543 [3] Information Systems PRE: GE 1108
IE 1566 [3] Industrial and Environmental Safety
IE 15XX [3] Technical Elective I PRE: Depending on the Course
IE 15XX [3] Technical Elective II PRE: Depending on the Course
IE 1593 [3] Graduation Project II PRE: IE 1493
GE 1599 Cooperative Training [4] (Pre-requisite: 152 credits)
[6 / 17]
[1 / 4]
No. of Courses / Credits each Trimester:
[7/ 17]

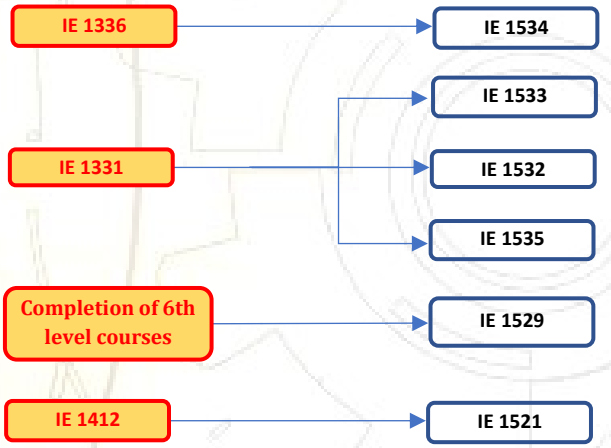
Industrial Engineering Program - Fifth Year- Elective Courses

Design and Manufacturing



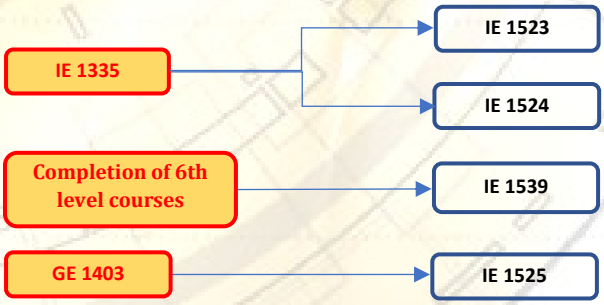
IE1323	*Quality Control*
IE1514	Saudi Standards and Specifications
IE1519	Special topics in Design and Manufacturing

Operations Management (Production/Quality/ Maintenance)

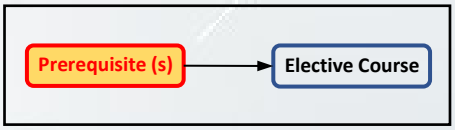


IE1336	*Operations Research II*
IE1534	Forecasting Methods and Applications
IE 1331	*Production Planning and Inventory Control*
IE1533	Inventory Decision Systems
IE1532	Enterprise Resource Planning (ERP)
IE1535	Introduction to Health Systems Management
IE1529	Special Topics in Quality Engineering
IE 1412	*Reliability and Maintenance*
IE1521	Maintenance Engineering and Management

Analysis and Improvements



IE1335	*Operations Research I*
IE1523	Data Analysis & Decision Making
IE1524	Strategic Management
IE1539	Special topics in Systems Engineering and OR
GE1403	*Engineering Economy*
IE1525	Engineering Accounting and Cost Estimation



كلية الهندسة

Curriculum Distribution according to levels and hours

Course code	Course Number	Arabic Name	English Name	Arabic code	No. of credit hours					Shared Departme nt	Compulsor y or elective
					Credits	Theoretical	Practical	Tutorials	Contact hours		
Level 1											
QUR	1001	القران الكريم - مقرر جامعة إجباري من الحزمة (1)	Quran - Required University Course (Package 1)	قرا	2	2	0	0	2		Compulsory
UNI	1001	مقرر جامعة إختيارى-2 من الحزمة (1)	Elective University Course 2 from Package 1	UNI	2	2	0	0	2		Elective
MAT	1122	مبادئ الرياضيات	Pre-Calculus	ريض	3	3	1	0	4	قسم الرياضيات	Compulsory
PHY	1117	فيزياء 1	Physics I	فيز	3	3	1	0	4	قسم الفيزياء	Compulsory
PHY	1119	مختبر فيزياء 1	Physics I Lab	فيز	1	0	0	2	2	قسم الفيزياء	Compulsory
GE	1103	الرسم والتصميم الهندسي	Engineering Graphics and Design	هعم	3	3	1	0	4	الميكانيكية	Compulsory
ENG	1120	الكتابة الفنية باللغة الإنجليزية	Technical Writing in English	نجل	3	3	1	0	4	كلية اللغات والترجمة	Compulsory
					17	16	4	2	22		
Level 2											
UNI	1002	مقرر جامعة إختيارى-3 من الحزمة (2)	Elective University Course 3 from Package 2	UNI	2	2	0	0	2		Elective
UNI	1003	مقرر جامعة إختيارى-4 من الحزمة (2)	Elective University Course 4 from Package 2	UNI	2	2	0	0	2		Elective
UNI	1004	مقرر جامعة إختيارى-5 من الحزمة (3)	Elective University Course 5 from Package 3	UNI	2	2	0	0	2		Elective
MAT	1115	حساب التفاضل والتكامل 1	Calculus I	ريض	3	3	2	0	5	قسم الرياضيات	Compulsory
PHY	1118	فيزياء 2	Physics II	فيز	3	3	1	0	4	قسم الفيزياء	Compulsory
PHY	1120	مختبر فيزياء 2	Physics II Lab	فيز	1	0	0	2	2	قسم الفيزياء	Compulsory
CHM	1104	كيمياء عامة	General Chemistry	كيم	3	3	1	0	4	قسم الكيمياء	Compulsory
CHM	1105	مختبر كيمياء عامة	General Chemistry Lab	كيم	1	0	0	2	2	قسم الكيمياء	Compulsory
GE	1101	التقارير الهندسية	Engineering Reports	هعم	0	0	1	0	1		Compulsory
					17	15	5	4	24		

Curriculum Distribution according to levels and hours

Course code	Course Number	Arabic Name	English Name	Arabic code	No. of credit hours					Shared Departme nt	Compulsor y or elective
					Credits	Theoretical	Practical	Tutorials	Contact hours		
Level 3											
UNI	1005	مقرر جامعة إختيارى-6 من الحزمة (3)	Elective University Course 6 from Package 3	UNI	2	2	-	-	2		Elective
ARB	1001	المهارات اللغوية - مقرر جامعة إجباري من الحزمة (4)	Linguistic Skills - Required University Course (Package 4)	نحو	2	2	-	-	2		Compulsory
MAT	1116	حساب التفاضل والتكامل 2	Calculus II	ريض	3	3	2	-	5	الرياضيات	Compulsory
STA	1215	الاحتمالات والإحصاء للمهندسين	Probability and Statistics for Engineers	احص	3	3	1	-	4	الإحصاء	Compulsory
GE	1108	البرمجة للمهندسين	Programming for Engineers	هعم	3	2	1	2	5	علوم الحاسب	Compulsory
ME	1111	علم وهندسة المواد	Materials Science and Engineering	همك	3	3	1	-	4	المكانيكية	Compulsory
IE	1201	مقدمة في الهندسة الصناعية	Introduction to Industrial Engineering	صنع	0	0	1	0	1	الصناعية	Compulsory
					16	15	6	2	23		
Level 4											
UNI	1007	مقرر جامعة إختيارى-8 من الحزمة (4)	Elective University Course 8 from Package 4	UNI	2	2	-	-	2		Elective
MAT	1207	حساب التفاضل والتكامل 3	Calculus III	ريض	3	3	2	-	5	الرياضيات	Compulsory
MAT	1228	الجبر الخطي والمعادلات التفاضلية الأولية	Linear Algebra and Ordinary Differential Equations	ريض	3	3	2	-	5	الرياضيات	Compulsory
GE	1201	إستاتيكا	Statics	هعم	3	3	1	-	4	مدنية	Compulsory
GE	1305	مبادئ الهندسة الكهربية	Fundamentals of Electrical Engineering	هعم	3	3	1	-	4	الكهربائية	Compulsory
IE	1211	تصميم التجارب الهندسية	Engineering Experiment Design	صنع	3	3	1	-	4	الصناعية	Compulsory
					17	17	7	-	24		
Level 5											
UNI	1008	مقرر جامعة إختيارى-9 من الحزمة (5)	Elective University Course 9 from Package 5	UNI	2	2	-	-	2		Elective
FRC	1001	مقرر حر-1	Free Course 1	FRC	2	2	-	-	2		Elective
MAT	1236	طرق الرياضيات للمهندسين	Mathematical Methods for Engineers	ريض	3	3	1	-	4	الرياضيات	Compulsory
IE	1314	مختبر أساليب التصنيع	Manufacturing Processes Lab	صنع	1	-	1	2	3	الصناعية	Compulsory
IE	1315	أساليب التصنيع	Manufacturing Processes	صنع	3	3	1	-	4	الصناعية	Compulsory
IE	1325	إدارة هندسية	Engineering Management	صنع	3	3	1	-	4	الصناعية	Compulsory
IE	1335	بحوث عمليات 1	Operations Research I	صنع	3	3	1	0	4	الصناعية	Compulsory
					17	16	5	2	23		

Early exit for *Advanced Diploma in Industrial Engineering* (after completion of 2 credit hours starting from foundation year)

نقطة خروج (72 ساعة معتمدة من بداية السنة التأسيسية) – دبلوم متقدم في الهندسة الصناعية

Curriculum Distribution according to levels and hours

Course code	Course Number	Arabic Name	English Name	Arabic code	No. of credit hours					Shared Departme nt	Compulsor y or elective
					Credits	Theoretical	Practical	Tutorials	Contact hours		
Level 6											
FRC	1002	مقرر حر-2	Free Course 2	FRC	2	2	-	-	2		Elective
IE	1301	حلول كمية لتطبيقات الهندسة الصناعية	Quantitative Solutions for Industrial Engineering Applications	صنع	3	3	1	-	4	الصناعية	Compulsory
IE	1322	تصميم المنشئات ومناولة المواد	Facilities Design & Materials Handling	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1323	ضبط الجودة	Quality Control	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1331	تخطيط الإنتاج والتحكم فى المخزون	Production Planning & Inventory Control	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1336	بحوث العمليات 2	Operations Research II	صنع	3	3	1	0	4	الصناعية	Compulsory
					17	17	5	0	22		
Level 7											
FRC	1003	مقرر حر-3	Free Course 3	FRC	2	2	-	-	2		Elective
GE	1403	اقتصاد هندسي	Engineering Economy	هعم	3	3	1	-	4	الميكانيكية	Compulsory
IE	1412	الموثوقية والصيانة	Reliability and Maintenance	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1415	الأتمتة والتصنيع المتكامل بالحاسب	Computer Integrated Manufacturing and Automation	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1416	الأورجونوميا الصناعية	Industrial Ergonomics	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1417	المحاكاة والنمذجة والتحليل	Simulation Modeling and Analysis	صنع	3	3	1	0	4	الصناعية	Compulsory
					17	17	5	0	22		
Level 8											
UNI	1009	مقرر جامعة إختيارى-10 من الحزمة (5)	Elective University Course 10 from Package 5	UNI	2	2	-	-	2		Elective
GE	1401	إدارة مشاريع	Project Management	هعم	3	3	1	-	4	مدنية	Compulsory
IE	1411	تصميم وإجراءات العمل	Work Processes and Design	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1428	أنظمة الإنتاج	Production Systems	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1431	الخدمات اللوجستية وسلاسل الإمداد	Logistics and Supply Chains	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1493	مشروع تخرج 1	Graduation Project I	صنع	3	2	0	2	4	الصناعية	Compulsory
					17	16	4	2	22		

Curriculum Distribution according to levels and hours

Course code	Course Number	Arabic Name	English Name	Arabic code	No. of credit hours					Shared Departme nt	Compulsor y or elective
					Credits	Theoretical	Practical	Tutorials	Contact hours		
Level 9											
GE	1402	أخلاقيات المهنة للمهندسين	Professional Ethics for Engineers	هعم	2	2	-	-	2	كيميائية	Compulsory
IE	1543	نظم المعلومات	Information Systems	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	1566	السلامة الصناعية والبيئية	Industrial and Environmental Safety	صنع	3	3	1	0	4	الصناعية	Compulsory
IE	15XX	مقرر اختياري تخصصى-1	Technical Elective I	صنع	3	3	1	0	4	الصناعية	Elective
IE	15XX	مقرر اختياري تخصصى-2	Technical Elective II	صنع	3	3	1	0	4	الصناعية	Elective
IE	1593	مشروع تخرج 2	Graduation Project II	صنع	3	2	0	2	4	الصناعية	Compulsory
					17	16	4	2	22		
Level 10											
GE	1599	تدريب تعاوني	Cooperative Training	هعم	4	0	0	8	8	الصناعية	Compulsory
					4	0	0	8	8		
					Total Credit Hours						
					156	145	45	22	212		

Courses Descriptions

1. General Engineering

GE 1103	Engineering Graphics and Design	3 Credit Hours

This course introduces the students to the computer drafting software (AutoCAD) in order to be able to model parts and assemblies. It uses parametric and nonparametric solids, surface and wire frame models. It explains part editing, two-dimensional documentation of models along with the planar projection theory. It includes sketching of perspective, isometric, multi-view, and section views as a main tool to conceptualize ideas. It also explains dimensioning guidelines and tolerance techniques. A Team or an individual design project will be assigned as a final illustration to increase students understanding of drawing techniques and solving problem through design learned in the course.

ENG 1120	Technical Writing in English	3 Credit Hours

The Course will enable students to develop the knowledge, skills and values required for effective technical writing in business. Students will learn to write clear, concise, and audience-specific documents such as emails, memos, proposals, and reports required for business communication and needs.

GE 1101	Engineering Reports	0 Credit Hours

This course introduces students to the fundamentals of technical writing and reporting within the field of engineering. The course focuses on developing skills for clear, concise, and accurate communication of technical information. Students will learn how to structure and write professional engineering reports, including laboratory reports and project reports. Emphasis is placed on effective use of data, proper formatting, referencing standards, and presentation techniques. The course also covers the importance of adhering to ethical standards in engineering communication and prepares students to present their findings both in written form and through oral presentations.

GE 1108	Programming for Engineers	3 Credit Hours

In this course, students will study fundamentals of programming, development of simple algorithms, basics to intermediate levels MatLab programming, defining variables, understanding mathematical operations in MatLab, use of built-in functions, plotting data in graphics module, M-files structure, function files, structured programming, nesting and indentation, introduction to Simulink, and solution of fundamental engineering problems through programming.

GE 1201	Statics	3 Credit Hours

Vector analysis, Forces, Moments, and Couples, Resultants of Force Systems. Equilibrium Analysis and Free-Body Diagrams. Analysis of forces acting on members of Trusses and Frames. Shear-Force and Bending-Moment Distributions. Centroids, Center of mass, hydraulic pressure. Moment of Inertia, Parallel axis theorem, Polar Moment of Inertia and Product of Inertia.

GE 1305	Fundamentals of Electrical Engineering	3 Credit Hours

Basic laws: Ohm's, KVL, KCL. Resistive networks. Circuit analysis techniques: nodal and mesh analysis. Network theorems: Thevenin's, Norton's, source transformations, superposition, maximum power transfer. Energy storage elements. phasor technique for steady-state sinusoidal response. Transient analysis of first-order circuits.

GE 1403	Engineering Economy	3 Credit Hours

Time value of money formulas; Application of time value of money formulas; Project selection using net present worth analysis by the common multiple and study period methods; One and two parameter sensitivity analysis; Bond cash flows and pricing; Loan amortization and determining the remaining principle on a loan; Project selection using annual equivalent worth; Project selection using the incremental net present worth; Annual depreciation and book value using straight line; Declining balance and MACRS methods; Annual cash flow and net present worth; Discounted benefit/cost ratio for a public project; Inflation in estimating future cash flows; Defender/challenger replacement analysis using net present worth.

GE 1401	Project Management	3 Credit Hours

This course concentrates on the general methodology for managing a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the project manager. The course emphasizes on planning, scheduling, using arrow networks, execution and communications, project lifecycle, risk analysis, interface management, design review, design control assessment, reporting and reaction to critical problems. It also includes the characteristics of projects, design and process, labour, material and equipment utilization. Cost estimation, pricing and contracting, planning, cost control, monitoring and management systems are also covered.

GE 1402	Professional Ethics for Engineers	2 Credit Hours

Introduction to engineering ethics; definition of a profession, personal and professional ethics, exploration of many of the ethical issues, discussion of ethical theories, code of ethics, problem-solving techniques. Introduce engineer’s rights and responsibilities. Assess Safety, risk, and accidents. Explain the Rights and Responsibilities of Engineers.

GE1599	Cooperative Training	4 Credit Hours

8 weeks of training in a relevant industry under the supervision of an external supervisor from industry. Each student must submit a technical report about his learning experience during training in addition to fulfilling any other requirements as determined by the department.

2. Industrial Engineering Core Courses

ME1111	Materials Science and Engineering	3 Credit Hours

Introduction to Materials Science, Atomic Structure and Interatomic Bonding, Structures of Metals and Ceramics, Polymer Structures, Polymer's properties & processing, Mechanical Properties and Testing, Solidification of Metals and Alloys, Imperfections in Metals and Alloys, Phase Diagrams, Materials Strengthening Mechanisms, Classification of Metal Alloys, Basics of Corrosion and corrosion prevention.

IE1201	Introduction to Industrial Engineering	0 Credit Hours

This course provides a structured introduction to Industrial Engineering (IE) by following the life cycle of production systems from design to operation and continuous improvement. Students will explore the differences between manufacturing and service systems, and gain an understanding of key topics such as product design, process selection, facility planning, human factors, production planning, quality management, maintenance, and supply chain management. In the later part of the course, students will be introduced to the fundamental role of the Industrial Engineer in optimizing these systems, with a focus on cost minimization and efficiency. The course concludes with an introduction to essential cost management topics, including cost behaviour, financial statements, and Ratio analysis, and job costing.

IE1211	Engineering Experiment Design	3 Credit Hours

Design and analysis of observational and factorial experiments employing numerical and graphical methods. Topics include: Control charts; Probability plots; Multiple regression analysis; Confidence and prediction intervals; Significance tests.

IE1314	Manufacturing Processes Lab	1 Credit Hours

Practical demonstration and learning of various production processes such as metal cutting, machining, welding and sheets rolling etc. Study and familiarization with various measuring instruments. Measuring specified dimensions such as lengths, internal and external diameters radii, angles and taper dimensions. Estimating measurement variations. Identifying typical errors. Familiar with various safety measures.

IE1315	Manufacturing Processes	3 Credit Hour

Relationship between product engineering and manufacturing engineering, Metal casting: Fundamentals and processes, Metal forming: Fundamentals and bulk deformation, Metalworking processes and sheet metal working, Shaping Process of plastics, Powder metallurgy, Theory of machining operations, Fundamentals of welding and welding processes, Cutting-tools and machining processes, Grinding and other abrasive processes, Non-conventional machining (Electromechanical machining; Electro-discharge machining; Plasma Arc machining; Laser Beam machining; Electron Beam machining) and Heat treatment.

IE1325	Engineering Management	3 Credit Hours

Organization of engineering systems including production and service organizations; Organizational design and structure; Empowering and distribution of authority; Managing organizational change and innovation; Leadership; Teams and teamwork; Inputs of human skills, capital, technology, and

managerial activities to produce useful products and services; Economic analysis and construction of financial models for income, cash flow, balance sheet, valuation techniques, and replacement analysis; Innovation and technological cycles; Strategic, tactical and operational planning; Estimation of required capital and project acceptance criteria; Financial analysis, planning and control; Investment decisions; Human relations.

IE1335	Operations Research I	3 Credit Hours

Introduction to operations research models; Linear programming; Transportation; Assignment; CPM/MSPT techniques and their applications; Construction of models appropriate to particular applications; Development of optimal solutions; Introduction to advanced analytic techniques; Computer packages for problem solving.

IE1301	Quantitative Solutions for Industrial Engineering Applications	3 Credit Hours

This course introduces Industrial Engineering students to the fundamental and applied quantitative methods used to model, analyze, and solve industrial engineering problems. It covers root-finding, systems of equations, optimization, regression, interpolation, forecasting, and simulation. Emphasis is placed on applications in facility planning, production systems, forecasting, inventory management, quality control, and logistics. Students will learn both the theoretical foundations and computational implementation using software tools such as Excel, MATLAB, or Python.

IE1322	Facilities Design and Materials Handling	3 Credit Hours

This course provides a comprehensive understanding of the principles and methodologies of designing production facilities and material handling systems. Students will explore process design, flow analysis, activity relationship analysis, and ergonomics, alongside the selection and application of material handling equipment. The course emphasizes techniques for efficient space utilization, both in production areas and offices, focusing on enhancing productivity, safety, and ergonomics in the workplace.

IE1323	Quality Control	3 Credit Hours

Quality improvement and control methods with applications in design, development, manufacturing, delivery and service. Topics include: Quality management philosophies; Quality Engineering/statistical methods; Process control; Acceptance sampling; Control charts; Process capability studies; Loss functions; Experimentation for improvement.

IE1331	Production Planning and Inventory Control	3 Credit Hours

Production systems; Quantitative methods for forecasting; Aggregate planning; Inventory control; Materials requirement planning; Production scheduling; Capacity planning; Manpower planning and facility design; Shop floor control. Enterprise resource planning systems (ERP).

IE1336	Operations Research II	3 Credit Hours

Game theory; Network planning technique; Forecasting techniques; Nonlinear programming problems; Unconstrained optimization search techniques; Quadratic programming; Dynamic programming; Stochastic programming; Genetic algorithms; Heuristic methods; Markov chain; Queuing theory; Application of theoretical models and quantitative methods to solve practical problems of management using software solutions in the field of operations research.

IE1412	Reliability and Maintenance	3 Credit Hours

Maintenance concepts; Maintainability terms and definitions; Terotechnology; Preventive maintenance; Corrective maintenance; Maintenance planning; Control of maintenance activities; Materials and spare part management; Failure rate and measurements; Down time and repair time; Reliability and failure statistics; Application of waiting line theory to maintenance problem; Critical part scheduling; Measurement and evaluation of maintenance performance; Depreciation; Machine and equipment inspection; Maintenance planning; Root cause analysis of critical failures; Statistical techniques for product reliability estimation; Reliability models of components.

IE1415	Computer-Integrated Manufacturing and Automation	3 Credit Hours

This course emphasizes the integration of manufacturing enterprise using computer-integrated manufacturing (CIM) technologies. It employs CAD/CAM interface and other CIM sub-systems, database management, facility layout, product documentation, process planning, production planning and control, Group technology, teamwork, and manufacturing operations and management to bring about a student's- designed CIM-oriented enterprise.

IE1416	Industrial Ergonomics	3 Credit Hours

Consideration of human characteristics and limitations in the requirements for design of systems, organizations, facilities and products to enable human-centered design which considers human abilities, limitations and acceptance; Applied anthropometry and biomechanics; Human performance capability when interacting with machine and work environment; Human-machine interaction and human-organization interaction; Illumination and noise; Displays; Controls; Visual feedback; Information processing; Human error; Climatic factors; Stresses and workload.

IE1417	Simulation Modelling and Analysis	3 Credit Hours

Introduction to system simulation and its applications; Simulation packages languages; Discrete and Continuous simulation; Random numbers; Data collection and distributions; Model development; Model validation and verification; Statistical analysis of simulation models; Variance reduction; Calibration of simulation models; Simulation examples; Monte Carlo simulation; Case studies of industrial and manufacturing systems using discrete event simulations.

IE1411	Work Processes and Design	3 Credit Hours

This course introduces students to the principles and practices of work-study, focusing on methods engineering, work measurement, and work design. Students will learn techniques to analyze, design, and improve work processes for increased efficiency and productivity. The course includes theoretical instruction, applied case studies, and hands-on lab work with tools and software to develop practical skills in work-study and measurement.

IE1428	Production Systems	3 Credit Hours

This course provides a comprehensive overview of production systems, focusing on both deterministic and stochastic models to analyze and improve manufacturing systems. Students will explore key metrics such as cycle time, production rate, capacity, and variability to assess system performance. The course also covers various production strategies, advanced manufacturing systems, and improvement methodologies like lean manufacturing, group technology, and just-in-time (JIT) production systems.

IE1431	Logistics and Supply Chain	3 Credit Hours

This course offers an in-depth exploration of logistics and supply chain management from both strategic and operational perspectives. Key topics include the design and optimization of distribution networks, location and site selection problems, pricing strategies, inventory aggregation, sourcing, logistics, transportation mode selection, and warehouse operations. In addition, the course addresses critical issues such as logistics and customer value, managing lead times, integrating supply chain processes, and overcoming global supply chain barriers. Students will gain insights into managing risks and creating responsive, synchronized supply chains in an era of network competition.

IE1493	Graduation Project I	3 Credit Hours

The Graduation Project integrates the various components of the curriculum into a comprehensive design exercise. This course covers the preliminary phase of the Project. In this phase, the students choose a topic and a faculty advisor; define the project scope, which may include theoretical design, experimentation, fabrication or computer simulation and modelling. By the end of the semester, they should complete the Project Goals/Objectives, Project Execution Plan, a thorough literature review and some initial work as defined in the Execution Plan. They must submit a preliminary report of the work done at the end of the semester.

IE1543	Information Systems	3 Credit Hours

This course explores the role of information systems in supporting industrial engineering functions. It focuses on the documentation cycle in a manufacturing facility, the use of Enterprise Resource Planning (ERP) systems, and how advanced information technologies like the Internet of Things (IoT) are integrated into these systems. Students will learn how management reports are generated, including Key Performance Indicators (KPIs), financial ratio analysis, and how data is presented effectively using tools like PowerBI. Additionally, the course covers the importance of system integration, database management, and data security in managing information flows within manufacturing and supply chain operations.

IE 1566	Industrial and Environmental Safety	3 Credit Hours

Accident: causes and costs. Appraising safety performance and risk assessment. Analysis of accident causes. Accident reports and records. Job safety analysis. Plant inspection. Accident investigation. Plant layout and arrangement. Plant housekeeping. Maintenance and safety. Material handling and safety. Machine guarding. Explosion and fire prevention. Noise and environmental safety, Personal protection. Planning for emergencies.

IE1494	Graduation Project II	3 Credit Hours

A capstone design project should be planned to provide a unified effort in developing teamwork skills, multidisciplinary interaction, communication skills, fundamentals of engineering design processes, and application of engineering design principles to a real engineering project.

3. Electives

IE1514	Saudi Standards and Specification	3 Credit Hours

Study of different standards and specifications adopted by the Kingdom of Saudi Arabia and the GCC countries; Comparison among Saudi, GCC, and international standards; Standards and specifications preparation; Experimentation; Standards construction, implementation, enforcement, and monitoring; National and international quality awards and their effects on the industrial and service products; Standards and specifications effects on the industry competitiveness, product safety, and product quality.

IE1519	Special Topics in Design and Manufacturing	3 Credit Hours

This course is designed to introduce the fundamental concepts of design in manufacturing. Computer aided design (CAD) and computer aided manufacturing (CAM) will be covered, along with their integration.

IE1521	Maintenance Engineering and Management	3 Credit Hours

Maintenance concept; Maintenance models; Maintenance quality; Maintenance planning and management; Maintenance cost and staffing; Total productive maintenance; Autonomous maintenance; Chronic and sporadic losses; Depreciation modelling; Maintainability prediction; Failure mode effects and criticality analysis (FMECA); Computer aided maintenance management; Design for maintainability; Maintenance staffing; Spare parts management.

IE1523	Data Analysis & Decision Making	3 Credit Hours

Basic statistical analysis concepts; Data mining methods; Decision-making methods; Cluster analysis and dimension reduction; Economic decision; Multi-objective optimization, decision in uncertain environments; Practical issues in decision-data-analytics.

IE1524	Strategic Management	3 Credit Hours

Value and process of strategic management; Integrate and apply knowledge to strategic decision making in organizations; Explore the organization's vision, mission; Principles, techniques and models of organizational and environmental analysis; Theory and practice of strategy formulation and implementation; Corporate governance and business ethics for the development of effective strategic leadership.

IE1525	Engineering Accounting and Cost Estimation	3 Credit Hours

This course provides students with a solid foundation in both financial and managerial accounting with a specific focus on cost estimation in manufacturing contexts. It introduces the fundamental concepts of accounting, including the accounting cycle, financial statement preparation, and the principles underlying Generally Accepted Accounting Principles (GAAP). The managerial accounting component emphasizes financial analysis, cost control, and budgeting. Students will also explore cost accounting techniques such as job costing, activity-based costing (ABC), and cost of goods manufactured and sold, with a focus on applying these principles to manufacturing systems, facilities, and production processes. Special attention is given to cost estimation techniques, with an introduction to parametric, analogous, bottom-up, and top-down approaches, ensuring students can accurately estimate and manage costs in manufacturing environments.

IE1529	Special Topics in Quality Engineering	3 Credit Hours

Topics relevant to the industrial and service quality engineering, quality control, and quality assurance to strengthen student's knowledge in these fields using qualitative and quantitative techniques. The varying course contents must be approved by the IE Department Council.

IE1532	Enterprise Resource Planning	3 Credit Hours

Definitions and ERP framework; ERP architecture and design; ERP system packages and databases; Procurement and outsourcing; ERP-Internet integration; ERP system maintenance; Applications and case studies.

IE1533	Inventory Decision Systems	3 Credit Hours

Dynamics of inventory management as they relate to the entire supply chain; Demand types; Distribution; Product transformation processes; The inter-relationships among all supply chain functions; Methods and techniques for reducing the holding cost of inventories while providing an efficient and effective service to customers; Contemporary aspects of material management; Controlling different inventory setups; Material requirements planning (MRP); Receiving; Warehousing.

IE1534	Forecasting Methods and Applications	3 Credit Hours

Introduction to quantitative methods of forecasting; Data considerations; Model selection; Decomposition Methods; Exponential smoothing; Regression models; Autoregressive integrated moving average (ARIMA) models; Advanced forecasting models; Forecasting errors and confidence intervals; Combining forecasting results; Forecasting implementation; Long term forecasting.

IE1535	Introduction to Health Systems Management	3 Credit Hours

Health systems; Organizational behavior; Lean concepts; Patient-flow analysis; Inference and data-driven knowledge generation; Decisions and change; Forecasting, operations, and optimization of health resources; Quality in healthcare systems; Cost and revenues in healthcare systems; Teamwork; Managing healthcare staff; Health care information systems.

IE1539	Special topics in Systems Engineering and OR	3 Credit Hours

Topics relevant to industrial systems to strengthen student's knowledge in this field using qualitative and quantitative techniques. The varying course contents must be approved by the IE Department Council.