نموذج (هـ)

مختصر توصيف المقرر

Course number: ISE 200	Course name: Statics
Language: English	Pre-requisites: MATH 103T + PHYS 102
Credit hours: 3 (3+ 1+ 0)	Course level: Level 3

وصف المقرر: **Course Description**

يقدم هذا المقرر المفاهيم الهندسية على أساس القوى في حالة التوازن. وتشمل المواضيع: أنظمة القوى: تحليل متجهات القوى، العزوم، عزم الازدواج في الأنظمة ذات الأبعاد الثنائية والثلاثية، توازن القوى، التحليل الإنشائي: الدعامات المستوية والهياكل، توزيع القوى: مراكز الأجسام والأشكال المركبة، عزوم القصور الذاتي للمساحات، الاحتكاك.	This course introduces the concepts of engineering based on forces in equilibrium. Topics include: Force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions. Equilibrium of forces. Analysis of structures; plane trusses and frames. Distributed force system: centroids of simple and composite bodies. Area moments of inertia. Analysis of beams. Friction.

الموضوعات التي سيتم تناولها: **Topics to be covered**

قائمة الموضوعات	No. of lectures	List of topics
مقدمة	1	Introduction
أنظمة القوى	13	Force Systems: 2D and 3D
اتزان القوى	5	Equilibrium of forces
تحليل الدعامات والهياكل	8	Analysis of trusses and frames
توزيع القوى	6	Distribution of forces, centroids of regular and composite bodies
عزم القصور الذاتي للمساحات	6	Area moment of inertias
قوى القص والعزوم لدعامات بسيطة	4	Shear force and moment diagrams for simple determinate beams
الاحتكاك	2	Friction

أهداف المقرر: **Course Aims**

تتلخص أهداف هذا المقررفي ما يلي: ١) تمكين الطالبات من فهم ميكانيكية الأجسام في حالة السكون وتحليل القوى والمتجهات ٢) تحديد مراكز الكتلة وعزم القصور الذاتي ٣) تطبيق مبادئ الميكانيكا الأساسية لتحليل المنشآت الهندسية الثابتة.	The objectives of the course are to: 1) Enable students to understand statics of rigid bodies including vector analyses, forces 2) Determine centers of mass and moments of inertia 3) Apply of basic mechanics principles for the analysis of static engineering structures.

مخرجات التعليم: (الفهم والمعرفة والمهارات الذهنية والعملية)

يفترض بالطالبة بعد دراستها لهذا المقرر أن تكون قادرة على:

تطبيق مفاهيم الاتزان على المنشآت المختلفة	Apply the concepts of equilibrium to various structures.
رسم مخططات الجسم الحر للأجزاء والاجسام الصلبة.	Draw free-body diagrams of particles and rigid bodies.
تحديد القوى الداخلية في المنشآت وقوة القص وعزم الانحناء في الدعامات	Determine internal forces in structures and shear force and bending moment in beams.
حساب مركز الثقل وعزم القصور الذاتي للأشكال البسيطة والمعقدة.	Calculate centroid and moment of inertia of simple and complex shapes.

الكتاب المقرر والمراجع المساندة:

اسم الكتاب	اسم المؤلف	اسم الناشر	سنة النشر
Engineering Mechanics Volume 1 Statics 7th edition	J.L. Meriam, L.G. Kraige	John Wiley & Sons, Inc.	2012
Engineering Mechanics: Statics, 12th Edition	Russell C. Hibbeler	Prentice Hall	٢٠١٢

نموذج (هـ)

Summarized Course Description

Course number: ISE 201	Course name: Engineering Drawing
Language: English	Pre-requisites: ---
Credit hours: 3 (1+4 +0)	Course level: Level 4

Course Description **وصف المقرر :**

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. Development of surfaces. Sectioning. Introduction to assembly drawings. Steel sections. Standards and conventions. Computer Aided Graphics using SOLIDWORK crafting package. Applications

Course objectives **أهداف المقرر :**

- This course is intended to cover theory and practical techniques of engineering drawing. The course teaches the use of Solidworks as a CAD tool in making engineering drawings.

Course Outcomes **مخرجات التعليم:**

Upon completing the course, the student should be able to:

1. Develop 3D solid models using modern engineering 3D software, through 1.1 Using sketching commands and entities relationships,
   1.2 Using Extrude and Extrude Cut Commands,
   1.3 Using Revolve and Revolve Cut Commands,
   1.4 Using 3D sketch Commands,
   1.5 Using Sweep and Sweep Cut Commands,
   1.6 Using Loft and Loft Cut Commands,
   1.7 Using Assembly Commands to assemble several parts to create 3D assembled Models.
2. Use Drawing Sheet Commands to create:
   2.1 Orthographic and auxiliary views in 2D working drawings sheets.
   2.2 Section views in 2D working drawings sheets.
3. Conclude 3D models out of 2D models.
4. Use Sheet Metal Commands needed to develop sheet metals models.

Textbook and references **الكتاب المقرر والمراجع المساندة:**

Book	Authors	Publisher	Publication year
Students Manual, Solid Works notes, prepared			
Technical Drawing with Engineering Graphics,14th Edition	Frederick E. Giesecke	Pearson	2014
Solidworks tutorials,		Solidworks Help	

Weekly breakdown of course topics

Topics	Duration in weeks
1. Introduction, Sketching commands	1
2. Sketching, entities relationships commands	1
3. Extrude and extrude cut commands	2
4 Drawing sheet, dimensioning and sectioning commands	2
5. Concluding 3D models out of 2D drawings	3
6. Assembly commands and Toolbox	1
7. Revolve and revolve cut commands	1
8. 3D sketch and sweep commands	1
9. Loft and loft cut commands	1
10. Sheet Metal commands	1

Course syllabus

Course number and code: ISE 202	**Course Name:** Financial Management for Engineers
Teaching language: English	**Pre-requisite:** MATH 205 + MATH 221T
Approved credit: 2 (2 + 0 + 1)	**Level :** Fifth

Course Description:

The course covers a broad range of topics and explains the relationships between customers, employees, and shareholders in a corporate environment. The course covers the cornerstone financial concepts for engineering management to enable analysis of engineering projects from a financial perspective: income statements; the balance sheet; cash flow statements; financial ratio analysis; corporate organization; the time value of money; net present value; and discounted cash flow analysis are among the topics discussed.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Overview: Business of Engineering.	3
2.	Financial Analysis: Balance Sheet.	3
3.	Financial Analysis: Income Statement.	3
4.	Financial Analysis: Cash Flow.	3
5.	Business: Business Plan Preparation and Risk.	3
6.	Companies: Corporate Organizations and Hierarchy.	5
7.	Expenses: Payroll Processing, Tax Requirements, Hidden Expenses.	5
8.	Financial Ratios.	3
9.	Financial Analysis: Compounding Interest, Time Value of Money, Loans.	5
10.	Financial Analysis: Net Present Value and Company Valuation.	5
11.	Financial Analysis: Company Financial Statements.	4

Course objectives:

1. To enable students to understand the assumptions underlying the preparation, interpretation and analysis of the Income Statement, Balance Sheet and Cash Flow Statement.
2. To recognize the purpose, limitations, layout and presentation of financial statements.
3. To realize cost analysis in the context of short and long-term decision making and the use of discounted cash flow analysis
4. To evaluate the processes by which the value of both real and financial assets can be estimated.
5. To appraise the role of financial strategy within the business model of a firm.
6. To benefit from improved skills in learning, problem solving, numeracy written communication and self-management

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understand the general concepts of finance and accounting and how they relate to daily decision making.
2. Understand financial statements.
3. Identify and evaluate critical assumptions.
4. Develop financial policy for a department, unit, or organization.
5. Better understand and analyze the financial impact of both strategic and operational decisions on profitability.
6. Master the financial tools necessary to evaluate proposed projects such as acquisition of new equipment, lease versus buy decisions, and replacement of aging equipment, hiring, firing, and training new personnel.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
7th Edition, 2011	Cengage Learning	Eugene F. Brigham & Joel F. Houston	Fundamentals of Financial Management, Concise 7th Edition
5th Edition, 2000	Financial Times Management	E. J. McLaney	Business Finance: Theory and Practice
10th Edition, 2005	Prentice Hall	Keown, Martin, Petty, Scott.	Financial Management Principles and Applications

Course syllabus

Course number and code: ISE 203	**Course Name:** Engineering Ethics
Teaching language: English	**Pre-requisite:** ---
Approved credit: 2 (2 + 0 + 0)	**Level :** Fifth

Course Description:

Introduction to the ethics of Engineering Profession: The Engineering Profession; Ethics and Professionalism; Codes of Ethics; Catastrophic Engineering Failures; Case Studies. **Code of Ethics for National Society of Professional Engineers (NSPE)**: Fundamental Canons; Rules of Practice; Professional Obligations.
Computer Ethics: Data and Software; Intellectual Property; Privacy; Inappropriate Access; Hackers
Environmental Ethics: Sustainable Development. **Code of Ethics for Saudi Council of Engineers (SCE):** General rules; Rules of Practice.

Topics to be covered:

No.	**List of topics**	**No. of lectures**
1.	Introduction to the ethics of Engineering Profession.	3
2.	Case Studies on Catastrophic Engineering Failures.	4
3.	Code of Ethics for National Society of Professional Engineers (NSPE): Fundamental Canons.	4
4.	Code of Ethics for NSPE: Rules of Practice.	3
5.	Code of Ethics for NSPE: Professional Obligations.	4
6.	Computer Ethics.	4
7.	Environmental Ethics: Sustainable Development.	3
8.	Code of Ethics for Saudi Council of Engineers (SCE).	3

Course objectives:

1. Recognizing the impact of engineers' decisions on the society and the environment.
2. Understanding the rules of practice for Engineering Profession.
3. Understanding the Engineering Professional Obligations.
4. Recognizing the need for sustainable Development.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Describe and discuss key moral canons and concepts relevant to research and practice in engineering.
2. Locate and analyze the code of ethics of at least one professional society in the fields of engineering, and describe potential personal, professional, and societal consequences of actions that violate these codes.
3. Define unethical research and unethical practice in engineering.
4. Apply ethical concepts studied to new kinds of cases in engineering.
5. Articulate the importance of the concept of "conflict of interests".
6. Judge engineering decisions considering sustainable development principals.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2010	McGraw-Hill Higher Education	Mike W. Martin	Introduction to Engineering Ethics
2006	Saudi Council of Engineers (SCE)	Saudi Council of Engineers (SCE)	Code of Ethics for Saudi Council of Engineers (SCE)
2011	Cambridge University Press	Caroline Whitbeck	Ethics in Engineering: Practice and Research (2nd Edition)

Course syllabus

Course number and code: ISE 204	**Course Name :** Materials Science and Engineering.
Teaching language : English	**Pre-requisite** CHEM 103T + PHYS 103
Approved credit : 3 (2 +2 + 1)	**Level:** Fifth

Course Description:

Understanding engineering materials properties and processing parameters; Material compositions and structures; Ferrous and Non-Ferrous alloys, Ceramics, Composites**.**

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction to Materials.	6
2.	Structure of materials.	10
3.	Mechanical properties of materials.	10
4.	Ceramics.	10
5.	Polymers.	10
6.	Ferrous material.	10
7.	Non-Ferrous alloys.	10
8.	Composite Materials.	4

Course objectives:

1. This course is intended to cover theory and basic understanding of materials, their structures, properties, and applications by introducing the fundamental concepts of material science and engineering.
2. The course introduces structure- properties-processing-performance relationships of materials used in mechanical components.

Learning Outcomes :

Upon completing the course, the student should be able to:

1. Understand basic material properties.
2. Classify Materials.
3. Describe basic materials production.
4. Solve material testing and property problems.
5. Evaluate materials based on properties.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2001	John Wiley	William D. Callister	Fundamental of Materials Science and Engineering

Course syllabus

Course number and code: ISE 210	**Course Name:** Project Management
Teaching language: English	**Pre-requisite :** MATH 265
Approved credit: 3 (3 + 0 + 1)	**Level:** Sixth

Course Description:

The course teaches the terminology of graphs and networks, network flow problems, algorithms and solutions. Project management, defining the project, scheduling issues in projects, project duration optimization, resources planning, evaluation and progress, estimating times and costs, critical processes in the projects, applications of project-planning and software in the strategy of projects, integration of organization with projects and probability issues in project planning are addressed.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction.	3
2.	Project selection.	3
3.	Scope management.	6
4.	Project scheduling.	9
5.	Critical chain project scheduling.	9
6.	Resource management.	6
7.	Cost estimation.	3
8.	Project evaluation.	3
9.	Project termination.	3

Course objectives:

1. Understand the concepts of project planning and organization, budgeting and control, and project life cycles.
2. Understand the project plan contents and project communications.
3. Learn concepts related to organizational workflow including the staffing process, project planning elements, and
4. Master several basic project scheduling techniques including WBS, CPM, PERT, GANTT CHARTS, and resource constrained scheduling.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Improve written and oral communication skills through formal writing assignments and group discussions.
2. Become familiar with Microsoft Project in performing simple project management tasks.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
4th Edition 2015	Pearson	Jeffery K. Pinto	Project Management: Achieving Competitive Advantage
7th Edition 2017	Project Management Institute	Project Management Institute	A guide to the Project Management body of knowledge (PMBOK Guide)

Course syllabus

Course number and code: ISE 220	**Course Name:** Production Planning and Control (1)
Teaching language : English	**Pre-requisite :** ISE 240
Approved credit : 3 (3 + 0 + 1)	**Level :** Sixth

Course Description:

Introduction to operations management, system productivity calculations, qualitative and quantitative forecast measurements, monitoring and control, industry process capacity analysis, management and control of inventory, management of inventory for probabilistic demand, supply chain strategies, benchmarking and its performance measurement.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction to operations management and Productivity.	6
2.	Operations strategy.	3
3.	Design of goods and services.	3
4.	Forecasting methods and analysis Introduction to forecasting, Steps in forecasting system, Forecasting approaches (Qualitative and Quantitative), Monitoring and controlling forecasts, Forecasting applications/cases .	12
5.	Capacity planning Design and effective capacity, Demand and capacity management, Bottleneck analysis and management, Break even analysis and EMV to capacity decision.	9
6.	Inventory Management Functions of Inventory, ABC analysis, Inventory models, EOQ, Reorder Point, POQ, Discount model, Safety Stock, Fixed Period model.	12

Course objectives:

1. Understand industrial engineering and operations management.
2. Make use of managerial concepts and quantitative techniques required in the area of productivity, forecasting, capacity planning, & inventory
3. Understand use several forecasting techniques, the functions of inventory and formulate basic inventory models, operations strategy and product/service design.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Identify and recognize the operations management and productivity.
2. Understand strategies in operations management.
3. Recognize steps in developing new products/services.
4. Recall forecasting and use several forecasting techniques.
5. Recall the capacity planning find the capacity (machines, material and labors) and locate bottleneck stations.
6. Recognize the procedures and methods of managing inventory.
7. Understand supply chain evaluation, performance measurement, risk analysis, supplier selection.
8. Assignments, projects.
9. Recognize the techniques and methods for designing and evaluating industrial operations issues.
10. Motivate to work in teams and communicate effectively through class discussions and presentations.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
12th Edition 2016	Pearson	Jay Heizer, Barry Render, AND Chuck Munson	Operations Management: Sustainability and Supply Chain Management
1st Edition 2017	John Wiley & Sons	V. BELVEDERE AND A. GRANDO, Egea.	Sustainable Operations Management,

Course syllabus

Course number and code: ISE 230	**Course Name:** Quality Control
Teaching language: English	**Pre-requisite :** MATH 265
Approved credit: 3 (3 + 0 + 1)	**Level:** Sixth

Course Description:

Basic definitions, concepts and terminology used in quality control systems. Analytical, Practical and Statistical Engineering tools to improve quality, reliability and design in a manufacturing environment and Implement effective quality systems.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Course Introduction.	4
2.	Definitions of Quality and Quality Improvement.	4
3.	Statistical Methods and Management Aspects for Quality Control and Improvement.	4
4.	The DMAIC Process.	6
5.	Statistical Process Control.	4
6.	Methods and Philosophy of Statistical Process.	6
7.	Control Charts for Variables.	6
8.	Control Charts for Attributes.	6
9.	Process Capability Analysis & ratios.	4
10.	Process and Measurement System Capability Analysis.	4
11.	Exponentially Weighted Moving Average Control Charts.	4
12.	Moving Average Control Charts.	4

Course objectives:

1. To enable students to understand the concepts of quality, quality improvement, and aspects of quality control and improvement
2. To enable students to Setup control charts for variables data and attributes data.
3. To equip students with necessary knowledge for proper decisions related to quality control and improvement.
4. To understand how to reduce the variations in the quality control process output.
5. To become familiar with basic methods of statistical process control.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understand the philosophy and basic concepts of quality improvement.
2. Describe the DMAIC process (define, measure, analyze, improve, and control).
3. Demonstrate the ability to use the methods of statistical process control.
4. Demonstrate the ability to design, use, and interpret control charts for variables.
5. Demonstrate the ability to design, use, and interpret control charts for attributes.
6. Perform analysis of process capability and measurement system capability.
7. Design, use, and interpret exponentially weighted moving average and moving average control charts.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
7th Edition, 2013	John Wiley & Sons	Douglas C Montgomery	Introduction to Statistical Quality Control
8th Edition, 2008	Pearson	Dale H Besterfield	Quality Control
2007	Springer	Balbir S Dhillon	Applied Reliability and Quality: Fundamentals, methods, and Procedures

Course syllabus

Course number and code: ISE 240	**Course Name:** Operations Research (1)
Teaching language: English	**Pre-requisite :** MATH 242T
Approved credit: 3 (3 + 0 + 1)	**Level:** Fifth

Course Description:

Introduction to mathematical programming and optimization. Characteristics of linear programs. Modeling of various industrial programs as linear programs. Graphical solutions. Introduction to the theory of simplex methods. Goal programming method. Transportation and assignment problems and solution techniques Network analysis: Shortest path, Minimum Spanning Tree, Maximum flow Problem and Minimum Cost Flow.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction to operations research.	3
2.	Linear programming modeling, and selected engineering and industrial applications.	14
3.	Graphical solutions of linear programs.	3
4.	The Simplex Method.	3
5.	Goal Programming.	3
6.	Transportation and assignment problems and solution techniques.	7
7.	Network analysis: Shortest path, minimum spanning tree, Maximum flow problem and minimum cost flow.	9

Course objectives:

1. Provide the basic knowledge and skills to design suitable.
2. Optimization tools for real-life engineering problems in various fields.
3. Use linear programming/network models formulations.
4. Use optimization software and spreadsheet-based interface.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. To introduce students to basic concepts in modelling and linear programming.
2. To solve linear programming models using graphical method.
3. To solve linear programming models using simplex method.
4. To be able to formulate a real-life problem (engineering and industrial applications) and solve them using an optimization software.
5. To be able to formulate a real-life problem (engineering and industrial applications) using network Flows and solve them.
6. To get exposed to an approach of multi-objective optimization, namely goal programming.
7. To get exposed to transportation and assignment problems and approaches to solve them.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
10th Edition 2016	Pearson	H. A. Taha	Operations Research: An introduction
2000	Eyrolles Editions	Christelle Guéret, Christian Prins, Marc Sevaux	2. Applications of optimization with Xpress-MP,
8th Ed. 2005	McGraw Hill	Hiller and Lieberman	Reference 1. Introduction to Operations Research
1993	Prentice Hall	Ravindra K. Ahuja, Thomas L. Magnanti, James B. Orlin	Network flows: theory, algorithms, and applications,

Course syllabus

Course number and code: ISE 250	**Course Name:** Decision and Data Analytics
Teaching language: English	**Pre-requisite :** MATH 265
Approved credit: 3 (2 + 2 + 1)	**Level:** Sixth

Course Description:

Integrate decision and data analytics together to solve real-world business problems. Hands-on system modeling, data collection and analysis, and report writing projects.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Overview: data analytics methods and tools.	5
2.	Statistical modeling techniques.	5
3.	Decision optimization modeling techniques.	5
4.	Discussion of data sources and data collection methods.	5
5.	Cluster analysis, dimension reduction, association rules and link analysis.	5
6.	Economic decision models.	5
7.	Multi-objective optimization, decision in uncertain environments.	5
8.	Nonlinear, dynamic and stochastic optimizations.	5
9.	Practical issues in decision-data-analytics.	10
10.	Business analytics system integration and system dynamics.	5
11.	Model assessment and averaging.	5
12.	Non-standard real-world problems for decision- and data-analytics.	10

Course objectives:

1. Developing an appreciation of how data and data analytics can be used by managers to make better decisions.
2. Understanding the need and importance of decision making in business, its inherent difficulties and pitfalls, and the importance of proper data analysis in management decision making.
3. Understanding how the data environment in business is changing and will continue to change in relation to management decision making.
4. Linking Business Analytics Goals to Decision-Data-Analytics (DDA) Processes.
5. Applying common quantitative and visual techniques to aid in management decision making.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Formulate real life problems into business and analytics goals technically
2. Construct decision and optimization mathematical models to meet business and analytics goals.
3. Establish data-analytic models to meet needs of decision and optimization models.
4. Collect appropriate data to estimate parameters in data-models. Use statistical software to build and validate models.
5. Employ decision and optimization software to solve decision problems
6. Experience how to work in a team environment efficiently and effectively.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
2012	Pearson	Business Analytics **1st Edition**	Business Analytics (**1st Edition**)
2007	Harvard Business School Press	Thomas H. Davenport & Jeanne G. Harris	Competing on Analytics: The New Science of Winning **(1st Edition)**
2006	John Wiley & Sons, Inc.	Alan Agresti	An Introduction to Categorical Data Analysis, Second Edition

نموذج (هـ)

Summarized Course Description

Course number: ISE 305	Course name: Engineering Economy
Language: English	Pre-requisites: Junior Level
Credit hours: 3 (3+ 0 + 0)	Course level: Level 7

Course Description **وصف المقرر :**

Introduction to concepts of economic decision-making from a cash flow viewpoint. It includes present worth analysis, cash flow equivalence, rates of return, replacement analysis, benefit-cost analysis, depreciation and taxes, and projects break-even point, selection, and sensitivity analysis.

Course objectives **أهداف المقرر :**

- Develop students' awareness of the concepts of cash flow approach, time value of money, product/project costing and rate of return.
- Introduce students to the process of integrating engineering proposals with economic analysis in order to select among several viable alternative projects.
- Understand and appreciate the models and measures used in decision making in the area of engineering economics.

Course Outcomes **مخرجات التعليم:**

Upon completing the course, the student should be able to:

2. Evaluate the economic feasibility of investments related to engineering projects.
3. Assess the impact of depreciation, taxation and other economic factors on projects' feasibility.
4. Conduct sensitivity analysis on key compounding parameters.
5. Develop policies for assets replacement.
6. Assess alternative financing modes.
7. Make financially prudent decisions in everyday life (car/home loans or investments).

Textbook and references **الكتاب المقرر والمراجع المساندة:**

Book	Authors	Publisher	Publication year
Fundamentals of Engineering Economics, 3rd Ed.	Park, Chan S.	Prentice Hall	2013
Engineering Economy and the Decision-making Process	Joseph C. Hartman	Pearson/Prentice Hall	2007
Engineering Economy	Leland Blank and Anthony Tarquin	McGraw-Hill	2012

Weekly breakdown of course topics

Week	Topic
1-4	Engineering economic decisions Cash Flows, Time Value of money & money management
5-6	Present and Future worth, annual equivalence analysis and Payback Period
7-8	Rate of return analysis
9	Bond Problems
10-11	Comparison of alternatives & replacement decisions
12-13	Depreciation
14	Corporate income tax Inflation and its impact on project cash flows
15	Economic analysis in the public sector (Benefit-Cost Analysis) Project break-even and sensitivity analysis

Course syllabus

Course number and code: ISE 311	**Course Name:** Supply chain management principles
Teaching language: English	**Pre-requisite :** Co requisite ISE 322
Approved credit: 3 (3 + 0 + 1)	**Level:** Eighth

Course Description:

The course examines supply chain management (SCM) and discusses its importance and benefits to the overall strategy and competitiveness of firms of all sizes.
Companies are evolving in an increasingly demanding and competitive global market. The course explores all of the key elements that comprise SCM.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction to Supply Chain Management.	4
2.	Purchasing and Supply Management.	8
3.	Creating and Managing Supplier Relationships.	4
4.	Strategic Ethical and Sustainable Sourcing.	4
5.	Process Management—Lean and Six Sigma Quality in Supply Chain Management.	8
6.	Domestic and International Logistics.	8
7.	Customer Relationship Management.	8
8.	Service Response.	4
9.	Supply Chain Process Integration.	4
10.	Performance Measurement Along the Supply Chain.	4

Course objectives:

1. The students develop ability to understand the supply chain and design of supply chain networks on the basis of the learned knowledge through the course and carry a design project.
2. Cover the theoretical basis as well as problem solving techniques through hand calculations and computer software.
3. Measure performance of the supply chain by using key performance indicators (KPIs) .

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Identify and recognize the supply chain terminology and integration with operations.
2. Recall the process design and planning procedures to manufacture a product and design manufacturing process and to find the capacity (machines, material and labors).
3. Understand the Operations—collaborative planning, forecasting, and replenishment (CPFR); just-in-time production (JIT); and total quality management (TQM).
4. Understand Logistics—the logistics behind transportation, customer relationships, network (re)design, and service management; also known as distribution.
5. Understand Integration—linking and sharing critical information systems: coordinating/integrating responsive systems; global integration; measuring key performance indicators (quality, accuracy, timeliness, and cost).
6. Communicate with industry, reporting and evaluating supply chains.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
4th Edition 2016	Boston, MA: Cengage Learning.	Wisner, J. D., Tan, K. C., & Leong, G. K.	Principles of supply chain management: A balanced approach

Course syllabus

Course number and code: ISE 321	**Course Name:** Production Planning and Control (2)
Teaching language: English	**Pre-requisite :** ISE 220
Approved credit : 3 (3 + 0 + 1)	**Level :** Seventh

Course Description:

Introduce students to the managerial concepts and quantitative techniques required in the areas of aggregate planning, MRP, scheduling for the short term, and decision modeling. To enable students to make efficient operations management decisions in practice.

Topics to be covered

No.	List of topics	No. of lectures
1.	**Aggregate planning:** What is aggregate planning? Aggregate planning strategies, mathematical approaches to planning, comparison of aggregate planning methods.	13
2.	**Material requirement planning (MRP):** Master production schedule, bill of material, MRP plan, lot size techniques (lot for lot, EOQ, PPB), introduction to MRP-II, ERP and SAP.	12
3.	**Short-term scheduling:** Scheduling issues, sequencing jobs, finite capacity scheduling, and theory of constraint introduction.	12
4.	**Assembly-line balancing:** Why line balancing, approach for line balancing.	7
5.	**Decision making tools:** Fundamentals of decision making, decision tree, multi criteria decision making.	12

Course objectives:

1. Understand industrial engineering and operations management.
2. Make use of managerial concepts and quantitative techniques required in the area of planning, analyze operations, scheduling and making decision.
3. Develop ability to design solutions for operations in factories/institutions on the basis of the learned knowledge through lectures, presentations and case studies.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understand industrial engineering and operations management.
2. Understand aggregate planning strategies.
3. Understand short term scheduling, theory of constraints.
4. Understand the concept related to assembly line balancing.
5. Understand decision making tools and their application in operations management.
6. Work in teams and communicate effectively through class discussions and presentations.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
12th Edition 2016	Pearson	Jay Heizer, Barry Render, AND Chuck Munson	Operations Management: Sustainability and Supply Chain Management
1st Edition 2017	John Wiley & Sons	V. BELVEDERE AND A. GRANDO, Egea.	Sustainable Operations Management,

Course syllabus

Course number and code: ISE 322	**Course Name:** Scheduling of Industrial Operations
Teaching language: English	**Pre-requisite:** ISE 341 + ISE 321
Approved credit: 3 (3 + 0 +1)	**Level:** Eighth

Course Description:

This course deals with various problems in the area of scheduling. It includes single machine, Parallel machine, Flow shop, Open shop, and Job shop and Project scheduling. Also, it introduces Project Scheduling which includes Activity-On-Node and Precedence Diagramming, Resource Levelling & Allocation, and Time Cost Trade-Off.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction.	3
2.	Scheduling Theory.	7
3.	Single Machine Problem.	6
4.	Parallel Machine Problem.	5
5.	Flow Shop Problem.	5
6.	Open Shop Problem.	3
7.	Job Shop Problem.	5
8.	Activity-On-Node and Precedence Diagramming.	5
9.	Resource Leveling & Allocation.	5
10.	Handling. Time Cost Trade-Off.	5
11.	Scheduling in Practice.	7

Course objectives:

1. The student will be able to describe the mathematical structure of production scheduling & sequencing problems and project scheduling problems
2. Also, the student will be able to design heuristics and constructive algorithms of fundamental problems.
3. In addition, the student will be able to independently learn algorithms, implement these algorithms in computer code and conduct computational experiments.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Ability to describe the mathematical structure of production scheduling & sequencing problems and project scheduling problems.
2. Ability to design heuristics and constructive algorithms of fundamental problems.
3. Independently learn algorithms, implement these algorithms in computer code and conduct computational experiments.
4. Exposure to various problems in the area of scheduling, such as single machine, Parallel machine, Flow shop, Open shop, and Job shop and Project scheduling.
5. Learn how to manage and schedule projects in which he will learn Activity-On-Node and Precedence Diagramming, Resource Leveling & Allocation, and Time Cost Trade-Off,
6. Ability to solve large scale scheduling problem using one of the scheduling software packages which is lekin.
7. Exposure to various practical scheduling problem.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
2016	Springer	Michael Pinedo	Scheduling Theory, Algorithms and Systems

Course syllabus

Course number and code: ISE 331	**Course Name:** Industrial Safety Engineering
Teaching language: English	**Pre-requisite:** ISE 360
Approved credit: 2 (2 + 0 + 0)	**Level:** Eight

Course Description:

Principles of industrial accident prevention; accident statistics and costs; appraising safety performance; recognizing industrial health and safety hazards and recommending safeguards. Includes a study of the Occupational Safety and Health Act.

Topics to be covered:

N0.	**List of topics**	**No. of lectures**
1.	The Safety and Health Manager.	2
2.	Development of the Safety and Health Function.	2
3.	Concepts of Hazard Avoidance.	2
4.	Process Safety and Disaster Preparedness.	2
5.	Ergonomics.	2
6.	Health and Toxic Substances.	2
7.	Environmental Control and Noise Ventilation.	2
8.	Flammable and Explosive Materials.	2
9.	Personal Protection and First Aid.	2
10.	Fire Protection.	2
11.	Materials Handling and Storage.	2
12.	Machine Guarding.	2
13.	Safety precautions in Welding.	2
14.	Electrical Hazards.	2

Course objectives:

1. To develop a basic understanding of industrial accident problems, historical antecedents, legislation, and general principles of occupational safety and health.

2. To develop an awareness of accident sources, causes and factors in the environment which contributes to and cause hazardous conditions and unsafe acts in the industrial workplace.
3. To achieve a basic understanding of appraisal methods, analysis procedures, appropriate follow-up techniques as related to industrial accidents.
4. To develop an understanding of common hazards and potential problems in the man-machine environment and the basic principles of recognition, evaluation and corrective action measures.
5. To become familiar with the Occupational Safety and Health Act and some of the basic safety standards which are a part of OSHA.

6. To develop an understanding of the basic elements of an effective occupational safety and health program.
7. To familiarize students with specific health and safety activities and practices used to develop safe work procedures and habits.
8. To make students aware of a manager's responsibilities for safety in the workplace.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Identify and describe typical physical, chemical, biological, environmental and cyber hazards and appropriate responses in industry.
2. Describe application of protective practices pertaining to hazards in industry.
3. Recognize chemical hazards, equipment/ energy hazards, fire and explosion hazards, working area hazards, ergonomic hazards, and environmental hazards and describe proper precautions based on hazard labels and Safety Data Sheets.
4. Describe engineering, administrative, and personal protective equipment (PPE) hazard protections.
5. Describe alarm and indicator system engineering controls.
6. Describe safety, health, and environmental monitoring equipment.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
6th Edition, 2009	Prentice-Hall	Asfahl, C. Ray & David W. Rieske	Industrial Safety and Health Management
2nd Edition, 2006	John Wiley & Sons, Inc.	Roger L. Brauer	Safety and Health for Engineers
1st Edition, 2013	American Society of Safety Engineers	Joel M. Haight	Principles of Industrial Safety

Course syllabus

Course number and code: ISE 341	**Course Name:** Operations Research (2)
Teaching language: English	**Pre-requisite:** ISE 240
Approved credit: 3 (3 + 0 + 1)	**Level:** Seventh

Course Description:

The course aims to provide the basic knowledge and skills to design suitable optimization tools for real-life engineering problems in various fields by using integer programming, dynamic programming and nonlinear programming. Approaches by Markov chain and queuing theory are considered to enhance students' capabilities to tackle different type of problems.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Integer programming: Formulations and industrial applications Solution methodologies: Dakin's Branch and Bound method.	13
2.	Dynamic programming: Characteristics of dynamic programs Formulation and applications.	10
3.	Nonlinear programming: Sample applications and graphical illustrations One variable unconstrained optimization Multivariable unconstrained optimization Constrained optimization and Karush-Kuhn-Tucker conditions Quadratic programming.	11
4.	Discrete time Markov chains: Markov chains-Basic concepts Steady state distribution in Markov chains & applications Absorption probability distribution & applications.	11
5.	Queueing Models: Markovian Models with single servers' Markovian models with multiple servers Models with limited capacities Queuing decision models.	11

Course objectives:

1. Provide the basic knowledge and skills to design suitable optimization tools for real-life engineering problems in various fields.
2. The students develop ability to design of factories on the basis of the learned knowledge through the course and carry a design project for factory system.
3. Use optimization software and spreadsheet-based interface.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. To introduce the students to more deterministic models in operations research in addition to providing tools in stochastic environments and to their solution methods.
2. To emphasize the formulations of the industrial and engineering problems as integer, dynamic and nonlinear programs, and to learn the techniques to solve them.
3. To expose the students to the engineering applications of stochastic models, particularly of Markov chains, and queueing problems and their solutions methods.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
10th Edition 2016	Pearson	H. A. Taha	Operations Research: An introduction
8th Ed. 2005	McGraw Hill	Hiller and Lieberman	Introduction to Operations Research

Course syllabus

Course number and code: ISE 342	**Course Name:** Regression and Forecasting
Teaching language: English	**Pre-requisite :** MATH 353T + MATH 265
Approved credit: 3 (3 + 0 + 1)	**Level:** Eighth

Course Description:

Simple linear regression; multiple linear regression; least squares estimates of parameters; hypothesis testing and confidence intervals in linear regression models; testing of models, data analysis and appropriateness of models; linear time series models; moving average, autoregressive and/or ARIMA models; estimation, data analysis and forecasting with time series models; exponential smoothing techniques; forecasting errors and confidence intervals .

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction and review of statistics.	4
2.	Simple linear regression.	4
3.	Multiple linear regression.	7
4.	Model building and residual analysis.	10
5.	Advance Topics in Regression.	4
6.	Forecasting: Time series regression.	4
7.	Exponential smoothing.	4
8.	ARIMA models.	7
9.	Seasonal ARIMA modeling.	4
10.	Estimation of models, forecasting errors and inference.	4
11.	Transfer function models.	4

Course objectives:

1. Understanding the regression and forecasting models and their applications in various fields of science and engineering.
2. Formulating real life problems using regression and forecasting models.
3. Using relevant statistical tools for model evaluation and choosing the appropriate models for analysis.
4. Use statistical software to estimate the models from real data and draw conclusions and develop solutions from the estimated models.
5. Teaching students how to communicate the statistical analyses of substantial data sets through explanatory text, tables and graphs.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understand the difference between time series forecasting and causal (regression) forecasting.
2. Compute forecasts using various methods and tools and measure forecast accuracy
3. Formulate real-life problems using regression and forecasting models.
4. Collect appropriate data for solving the problems.
5. Use statistical software to estimate the models from real data.
6. Draw conclusions and develop solutions from the estimated models.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
4th Edition, 2005	Cengage Learning	Bruce L. Bowerman, Richard O'Connell, Anne Koehler	Forecasting, Time Series, and Regression
2008	Wiley	Douglas C. Montgomery, Cheryl L. Jennings, Murat Kulahci	Introduction to Time Series Analysis and Forecasting
13th Edition, 2017	Pearson	James T. McClave, P. George Benson, Terry Sincich	Statistics for Business and Economics

Course syllabus

Course number and code: ISE 343	**Course Name:** Design of Experiments
Teaching language: English	**Pre-requisite :** ISE 250 + MATH 265
Approved credit: 3 (3 + 0 + 1)	**Level:** Eighth

Course Description:

The course aims to provide the knowledge and skills to design, analyze, interpret the results and make conclusions from an experiment. The course covers the theoretical basis of these points as well as problem solving techniques through hand calculations and computer software.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction to Design of Experiments.	4
2.	Hypothesis Testing and Simple Comparative Experiments.	8
3.	Experiments with a Single Factor: Analysis of Variance.	8
4.	Randomized Complete and Incomplete Blocks Designs.	4
5.	General Factorial Designs.	8
6.	2^k Factorial Designs.	8
7.	Regression.	8
8.	Surface Response Methods.	8

Course Objectives:

1. Provide the knowledge and skills to design, analyze, interpret the results and make conclusions from an experiment.
2. Cover the theoretical basis of these points as well as problem solving techniques through hand calculations and computer software.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understand the theoretical basis of the need of running experiments and experimental design.
2. Explain the source of errors.
3. Describe sampling distributions, hypothesis testing and simple comparative experiments.
4. Define experiments with a single factor and solve them with analysis of variance technique.
5. Explain randomized complete block designs.
6. Design experiments using general factorial design with two or more factors.
7. Conduct one factor and multi-factor regression.
8. Analyze data using Minitab.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
8th Edition 2012	John Wiley & Sons, Inc.	Douglas C. Montgomery	Design and Analysis of Experiments,

Course syllabus

Course number and code: ISE 351	**Course Name:** Production Information Systems
Teaching language: English	**Pre-requisite:** ISE 220
Approved credit: 3 (2 + 2 + 1)	**Level:** Seventh

Course Description:

The course teaches the design and analysis of production information systems, critical success factors for companies, effectiveness and efficiency through information systems usage in production and service systems, success cases in industry.
Investigation of data modelling, storage, acquisition and utilization in Industrial Engineering via manual and computerized methods.
Development of effective spreadsheet applications, design and implementation of relational databases, web-based database applications, interface design, the system development life cycle applied to data management applications,
ERP (Enterprise Resource Planning) software and decision support systems are addressed.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction to IS development.	5
2.	Database modeling and design.	20
3.	Structured analysis and functional architecture design.	10
4.	Informational architecture and logical design.	5
5.	Object-oriented analysis and design (UML).	20
6.	E-business and web-enabled database.	10

Course objectives:

1. Understand the role, instances, components, and development life cycles, of the information systems (IS) in industrial and service organizations.
2. Acquire the ability to model, design and implement relational database.
3. Acquire the ability to model the functions, logical architecture and data flows of IS.
4. Acquire the ability to model and design the User interface.
5. Acquire the ability to model and design Object-oriented IS
6. Get acquainted with development and role of e-business and web-enabled database as IS for the supply chain.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Get the student acquainted with information system (IS) development concepts, life cycles, and tools, with special focus placed on Production IS (PIS).
2. Have the students able to develop and communicate industrial information systems models.

Text book and referencs:

Year of Publication	Publisher name	Author name	Book name
2006	Academic Presss – Elsevier	Thomas Boucher & Ali Yalcin	Design of Industrial Information Systems
fourth edition, 2011	Pearson Education International, Upper saddle river	Jeffrey Hoffer, Joey Goerge & Joseph Valacich	Modern Systems Analysis and Design

Course syllabus

Course number and code: ISE 360	**Course Name:** Human Factor Engineering
Teaching language: English	**Pre-requisite:** ISE 250
Approved credit: 3 (2 + 2 + 1)	**Level:** Seventh

Course Description:

Introduction to Human Factors; Human-Machine Systems; Information Theory; Human capabilities; Display and Control Design; Hand Tools and Devices; Workplace Design; Environmental and Thermal factors; Physical Work and Manual Materials Handling and Speech Communications.

Topics to be covered:

No.	**List of topics**	**No. of lectures**
1.	Introduction, Human-Machine systems.	3
2.	Information Input and Processing.	3
3.	Human Capabilities: Hearing, Vision, and Psychomotor Skills.	8
4.	Human-Machine Interfaces, Display Design.	8
5.	Control Design, Feedback and Control.	7
6.	Hand Tools and Devices.	7
7.	Workplace Design.	7
8.	Environmental and Thermal Factors, Lighting, Air Pollutants, Noise, Vibration.	5
9.	Physical Work and Manual Materials Handling.	7
10.	Work-Related Musculoskeletal Disorders.	5
11.	Ergonomic work assessment techniques.	3
12.	Design Applications.	3

Course objectives:

1. The course introduces the students to the field of human factors so that they can make full recognition of the abilities and limitations of human beings (operator or user) in order to enhance certain desirable values such as safety, job satisfaction, efficiency, and wellbeing.
2. The course helps the student in understanding how to optimize the relationship between people and technology.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understand the type of interactions (and the interfaces needed) between humans and any physical entity.
2. Learn the process of information processing and how it affects the behavior and capabilities of humans.
3. Have the ability to recognize human capabilities and limitations.
4. Have the ability to make ergonomic assessments and propose improvements for controls, hand tools, devices, and the workplace.
5. Learn the importance of anthropometric considerations in the design of machines, tools, devices, products, and workplaces.
6. Learn how humans are affected by environmental and thermal factors, lighting, and vibrations.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
1993	McGraw-Hill	Sanders & McCormick	Human Factors in Engineering and Design

Course syllabus

Course number and code: ISE 361	**Course Name:** Work and process improvement
Teaching language: English	**Pre-requisite:** ISE 321
Approved credit: 3 (3 + 0 + 1)	**Level:** Eighth

Course Description:

Introduction to work analysis and design; methods engineering; study of the basic work measurement techniques; applications and limitations of the stop-watch time study, pre-determined motion time systems.

Topics to be covered:

No.	**List of topics**	**No. of lectures**
1.	Introduction; Productivity; Definition and Scope of Motion and Time Study.	3
2.	History of Motion and Time Study. The general problem-solving process.	2
3.	Work methods design; Process analysis.	7
4.	Activity charts; Man, and machine charts; Analysis and charting techniques.	10
5.	Micro-motion study; Motion study equipment; Film analysis.	3
6.	Fundamental hand motions; The use of fundamental hand motions.	5
7.	Principles of motion economy.	5
8.	Motion study; Mechanization and automation; Standardization.	5
9.	Time study; Time study equipment; Making the time study; Rating factor; Allowances; Standard time.	7
10.	Work sampling.	5
11.	Determining time standards from standard data and formulas.	5
12.	Predetermined time systems and 'MOST'; Computer applications.	10
13.	Measuring work by physiological methods; Fatigue and human factors.	3

Course Objectives:

1. The student will learn how to observe work in a systematic and disciplined way with the general objective of improving work methods and working conditions.
2. The student will be familiar with time study, work sampling, pre-determined time systems.
3. The student will establish a valid performance standard data.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Ability to approach a work design problem for the purpose of solving the problem.
2. Ability to understand the relationship between productivity and work analysis and design.
3. Ability to recognize the importance of studying the entire system or process of doing work before undertaking a thorough investigation of a specific operation in the process.
4. Ability to investigate a specific operation with the goal of finding improvements to the operation and implementing these suggested improvements to the process or the layout.
5. Ability to use various techniques, tools, equipment, and instruments needed to carry out motion and time study,
6. Ability to use other methods for measuring work such as predetermined-time-systems, work sampling and physiological methods.
7. Ability to design, conduct, analyze and interpret experiments in industrial systems.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2014	Prentice Hall	Groover, Mikell P	Work Systems and the Methods, Measurement, and Management of Work

Course syllabus

Course number and code: ISE 370	**Course Name:** Practical Training
Teaching language: English	**Pre-requisite**: completing 125 credits hours including 54 credits hours specialist
Approved credit: 1 (0 + 0 + 1)	**Level:** Summer session

Course Description:

Every students will spend an eight weeks practical training in a selected and approved industrial or services sectors. Then, the student will submit a report and conduct a presentation at the end of her summer training work.

Course objectives:

1. Provide an opportunity for students to gain a supervised practical experience in one of the industrial or services sectors
2. Students will gain a crucial on-site work experience. This exposure provides the student with a more mature outlook and has a significant effect on her understanding of her role as a practicing engineer.
3. Allows the students to develop communication skills, team work skills, build network, learn business skills, and problem-solving skills in the real work environment.
4. Also, would enable students entering a competitive job market in their career.

نموذج (هـ) –

مختصر توصيف المقرر

Course number: ISE 406	Course name: Engineering Management
Language: English	Pre-requisites: ISE 305
Credit hours: 3 (3+ 0 + 0)	Course level: Level 10

وصف المقرر: Module Description

This course is a general course designed to teach engineers the basic management skills they will need to be effective throughout their careers. It covers organization structure and the role of engineers in management of organizations. The management process, management and planning strategies, managerial functions related to production, inventory and human resources. Topics cover the basic elements of project planning and control including process of project management, strategic and intermediate term planning, organizing, leadership, motivation, finance, budgeting and operations management. Case studies pertaining to engineering problems will be utilized

أهداف المقرر: Module Aims

This course aims to equip engineers with key management principles and skills, they will need. The skills and knowledge covered in this course include necessary exposure to common engineering management topics such as planning, organizational structure and design, project and financial management and control, leadership, motivation, ethics and professionalism and the role an engineer can play in managing an organization. It also aims to expose students to qualitative tools to manage organizations and give them a chance to work in teams and give oral presentations and write a report.

مخرجات التعليم: (الفهم والمعرفة والمهارات الذهنية والعملية)

يفترض بالطالبة بعد دراستها لهذا المقرر أن تكون قادرة على:

Define the basic principles of management as applicable to engineering problems	
Apply appropriate management techniques for managing contemporary organizations using different case studies	
Use the techniques, skills, and modern engineering tools necessary for basic engineering management practices	
Apply qualitative tools and techniques to manage organizations like surveys, research, voting and other methods to draw conclusions and make decisions.	
Use appropriate project management tools like MS Project	
Communicate effectively in written/oral presentation	
Work effectively in teams	

الكتاب المقرر والمراجع المساندة:

سنة النشر	اسم الناشر	اسم المؤلف	اسم الكتاب
2014	Cengage Learning	Chuck Williams	MGMT
2016	Pearson	Jay Heizer and Barry Render	Principles of Operation Management

الموضوعات التي سيتم تناولها: **Topics to be covered**

List of topics	No. of Weeks	قائمة الموضوعات
Introduction to engineering and management	1	
Historical development of engineering management	1	
Forms of business and organizations	1	
Planning & forecasting and decision making	2	
Designing Adoptive organization	2	
Motivating and leading technical people	2	
Project Management	2	
Ethics & Social responsibility	1	
Financial control	2	

Course syllabus

Course number and code : ISE 412	**Course Name :** Operations of Manufacturing Systems
Teaching language : English	**Pre-requisite:** ISE 322
Approved credit : 3 (3 + 0 + 1)	**Level :** Ninth

Course Description:

This course introduces the students to the production management systems in both manufacturing and service indutry, such as Japanese manufacturing techniques, hybrid manufacturing management system, supply chain management, total quality management, design for manufacturing and assembly, bottleneck management. Optimized Production Technology, and Theory of Constraints.

Topics to be covered:

No.	**List of topics**	**No. of lectures**
1.	Introduction to advancement in manufacturing	4
2.	Material requirements planning, manufacturing resource planning, enterprise resource planning	10
3.	Just in time: building blocks of JIT, Toyota JIT system, kanban system for deterministic demand, kanban system for variable demand	8
4.	Push (MRP), Pull (Kanban) and Hybrid (CONWIP) production systems	8
5.	Total quality manufacturing: statistical quality control, quality and operations, quality and supply chain	6
6.	Supply chain management: managing raw materials, managing WIP, managing finished goods inventory, multi-echelon supply chains	10
7.	Mechanics of Kanban, CONWIP systems and bottleneck scheduling. Optimized Production Technology (OPT) and Theory of Constraints (TOC). Recent issues in production and operations planning	10

Course objectives:

1. Teach the student how manufacturing and service industry operate.
2. Provide the student an opportunity to gain in-depth knowledge of how to manage production systems
3. Introduces the students to the ERP, Just in time, Push – Pull and hybrid production systems, total quality manufacturing, and management. In fact, it leads one towards lean manufacturing that meets high throughput or service demands with little inventory.
4. Introduces the students to the Mechanics of Kanban, CONWIP systems and bottleneck scheduling. Optimized Production Technology (OPT) and Theory of Constraints (TOC). Recent issues in production and operations planning

Learning Outcomes :

Upon completing the course, the student should be able to:

1. Understand the operations of manufacturing systems
2. Understand the benefits and implications of using ERP system
3. Understand to reduce the WIP and improve the throughput by incorporation of kanban cards system
4. Understand to improve quality by effectively controlling the operations
5. Understand to efficiently manage the raw materials in the supply chain
6. Understand how to manage bottlenecks and implement the suitable related production management systems to optimize it.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2001	McGraw-Hill	Wallace J. Hopp and Mark L. Spearman	Factory Physics
1997	Addison-Wesley	J. Browne, J. Harhen, and J. Shivnan	Production Management Systems: An Integrated Perspective

Course syllabus

Course number and code: ISE 413	**Course Name:** Facility layout and operations
Teaching language: English	**Pre-requisite:** ISE 321 + ISE 341
Approved credit: 3 (3 + 0+ 1)	**Level :** Tenth

Course Description:

The course provides the knowledge and skills to design and evaluate an industrial facility capacity and a layout plan and carry a design project for a factory system. Also, the course gives the principle of location problem analysis.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Introduction: Production cycle and facility design; facility planning; Facility design phases.	3
2.	Product Analysis: Market and product requirements; Product Specification and design process.	3
3.	Production Analysis: Product-Process relations; industrial decisions (make or buy, technology select, production method); Production Method-layout relation; Process design and planning charts.	3
4.	Production Analysis: Capacity requirements calculation for production line and assembly line (machines and work stations, Labors, assembly line and raw material).	8
5.	Production Analysis: Material handling analysis (principles, unit load, equipment's types, selection and cost, handling system design and Evaluation.	8
6.	Factory Analysis: Area allocation and space determination of production, receiving and shipping, storage and warehousing, management departments, physical services departments.	8
7.	Factory Analysis: Flow Analysis and evaluation.	3
8.	Factory Analysis: Relationship analysis and Layout design; graphical, quantitative, qualitative methods, layout evaluation.	6
9.	Factory Analysis: Computerized layout.	8
10.	Location Analysis: Discrete and continuous location problems.	6
11.		

Course Objectives:

1. The students develop ability to design of factories on the basis of the learned knowledge through the course and carry a design project for factory system.
2. Cover the theoretical basis as well as problem solving techniques through hand calculations and computer software.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Identify and recognize the design stages of industrial facility and facility strategic planning.
2. Recall the design procedures and specifications of products and carry out data collection and analysis to estimate production volume and product specifications.
3. Recall the process design and planning procedures to manufacture a product and design manufacturing process and to find the capacity (machines, material and labors).
4. Recognize the procedures and methods of selecting and design of material handle and unit loads.
5. Recognize the procedures of area calculations of facility departments.
6. Recognize the designing factory flow and design facility layout, analyze of location problems and site selection.
7. Recognize the techniques and methods for designing and evaluating facility layout.
8. Work within facility design team.
9. Communicate with industry, reporting and evaluating industrial facility.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
4th Edition 2010	John, Wiley & Sons.	Tompkins, J & White J.,	Facility Planning,

Course syllabus

Course number and code: ISE 414	**Course Name:** Advanced topics in supply chain management (Elective)
Teaching language: English	**Pre-requisite:** ISE 311
Approved credit: 3 (3 + 0 + 1)	**Level: ninth or tenth**

Course Description:

The course provides an overview of state-of-the-art supply chain modeling and research methods.
In particular, uncertainty modeling and optimization approaches with application to multi-echelon inventory management, supply chain design, supply chain risk and supply chain coordination will be presented.
Advanced conceptual and methodological practices in designing and planning supply chain systems. Advances and
Strategies in supply chain procurement, transportation, distribution and warehousing, globalization, outsourcing, and technology.

Topics to be covered:

No.	**List of topics**	**No. of lectures**
1.	State-of-the-art supply chain modeling and research methods.	8
2.	Uncertainty modeling and optimization approaches with application to multi-echelon inventory management, supply chain design.	10
3.	Risk in supply chain management.	8
4.	Advanced conceptual and methodological practices in designing and planning supply chain systems.	11
5.	Advances and strategies in supply chain procurement, transportation, distribution and warehousing, globalization, outsourcing, and technology.	11
6.	Other topics.	8

Course Objectives:

1. The students develop ability to understand the advanced topics supply chain and design of supply chain networks on the basis of the learned knowledge through the course and carry a design project.
2. Cover the theoretical basis as well as problem solving techniques through hand calculations and computer software.
3. The students will be exposed to latest research in supply chain management.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Identify and recognize advanced topics in supply chain and integration of sophisticated methods for modelling risk and minimizing cost of logistics.
2. Be informed about advances and strategies in supply chain management.
3. Communicate with industry, reporting and evaluating supply chains.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
(2003),	Elsevier, Amsterdam	AG de Kok, SC Graves	Supply Chain Management: Design, Coordination and Operations, Handbooks in OR & MS, Vol. 11,
			All available reading for the instructors

Course syllabus

Course number and code : ISE 415	**Course Name :** Service operations management (Elective)
Teaching language : English	**Pre-requisite :** ISE 321
Approved credit : 3 (3 + 0 + 1)	**Level : Ninth or** Tenth

Course Description:

The course examines operations management in services, and discusses its importance and benefits to the overall strategy and competitiveness of firms of all sizes.
Companies providing are evolving in an increasingly demanding and competitive global market. The course explores all aspects on services: Banks, healthcare, education and other fields.

Topics to be covered:

No.	List of topics	No. of lectures
1.	The Role of Services in an Economy.	4
2.	The Nature of Services.	4
3.	Service Strategy.	4
4.	New Service Development.	7
5.	Service Quality.	7
6.	The Service Encounter.	4
7.	Service Facility Location.	4
8.	Managing Capacity and Demand.	7
9.	Growth and Globalization of Services.	4
10.	Forecasting Demand for Services.	7
11.	Service Supply Relationships.	4

Course objectives:

1. The students develop ability to understand the service operations management on the basis of the learned knowledge through the course and carry a design project.
2. Cover the theoretical basis as well as problem solving techniques through hand calculations and computer software.
3. Understand how operations are important in service industry.

Learning Outcomes :

Upon completing the course, the student should be able to:

1. Identify and recognize the operations management in services.
2. Understand the nature of services.
3. Make use of managerial concepts and quantitative techniques required in the area of service strategies, product development and quality.
4. Understand use several service capacity and demand (given of forecasted) techniques.
5. Understand the supply Relationships in service industry.
6. Communicate with industry, reporting and evaluating supply chains.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
8th ed. (2013).	New York: McGraw-Hill/Irwin.	Fitzsimmons. J. A., Fitzsimmons, M. J., & Bordoloi, S.	Service management: Operations, strategy, information technology

Course syllabus

Course number and code: ISE 416	**Course Name:** **Healthcare Systems Engineering** (Elective)
Teaching language: English	**Pre-requisite:** ISE 322
Approved credit : 3 (3 + 0 + 1)	**Level:** Ninth or Tenth

Course Description:

Explores components of healthcare system, existing problems in healthcare systems; need for engineering to analyze healthcare system problems; application of industrial engineering tools in improving healthcare system; role of industrial engineering in addressing healthcare policy issues

Topics to be covered:

No.	List of topics	No. of lectures
8.	Introduction to healthcare delivery system	1
9.	Complexity and systems in healthcare	1
10.	Finance, payment and Health IT	2
11.	Patient flow through healthcare system	1
12.	Reliability, patient safety, and human factors	2
13.	Lean and six sigma quality	2
14.	Healthcare system analytics	2
15.	Capacity management	1
16.	Healthcare logistics and supply chains	2
17.	IE for evaluating healthcare policies	1

Course objectives:

5. Analyze the context and components of the health care delivery systems. .
6. Select and critically evaluate the utility of key industrial engineering concepts and tools for assessing and modeling health care problems and challenges in health care delivery..
7. Demonstrate the use of IE techniques in solving selected health care delivery problems
8. Evaluate the roles of industrial engineers in health care.

Learning Outcomes :

Upon completing the course, the student should be able to:

7. Model, solve and analyze healthcare system problems using optimization and/or simulation tools
8. Explain the complex interactions that exist in healthcare systems.
9. Understand the healthcare delivery context
10. Describe the complexities that exist in the privacy, security and other policies in healthcare.
11. Apply systems engineering to a variety of healthcare contexts

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
1st Edition, 2016	Wiley	Paul M. Griffin, Harriet B. Nembhard, Christopher J. DeFlitch, Nathaniel D. Bastian, Hyojung Kang, David A. Munoz	Healthcare Systems Engineering
1st Edition, 2014	The MIT Press	William B. Rouse, Nicoleta Serban, Joel Moses	Understanding and Managing the Complexity of Healthcare (Engineering Systems)
2010	IOS Press	W.B. Rouse, D.A. Cortese	Engineering the System of Healthcare Delivery

Course syllabus

Course number and code : ISE 417	**Course Name :** Marketing Management and research (Elective)
Teaching language : English	**Pre-requisite :** ISE 322 **Co-requisite :** ISE 406
Approved credit : 3 (3 + 0 + 1)	**Level:** Ninth **or** Tenth

Course Description:

Study of marketing decision areas in the technically based firm, including product selection and development, marketing research, market development, distribution, advertising, and promotion. Pricing policies, including legal aspects and problems in selecting, training and controlling field sales force. Examination of interaction within consumer and industrial marketing environments.

Topics to be covered:

No.	List of topics	No. of lectures
1	Introduction Marketing Management	2
2	Marketing in the 21st Century	4
3	Understanding Your Consumer/Customer: Creating Customer Value, Satisfaction and Loyalty. Framework for Cross-Culture Consumer Behavior	8
4	Analyzing Consumer Markets	6
5	Designing and Managing Services	6
6	Market Segmentation	6
7	Developing Pricing Strategies and Programs	6
8	Designing and Managing Integrated Marketing Channels	8
9	Designing and Managing Integrated Marketing Communications	8
10	Managing Marketing in the Global Economy	6

Course objectives:

1. Introduces the students to the concept of marketing management.
2. Introduces the students to marketing decision areas in the technically based firm.
3. Introduces the students to product selection and development, marketing research, market development, distribution, advertising, and promotion
4. Introduces the students to the concept of pricing policies, including legal aspects and problems in selecting, training and controlling field sales force.

5. Introduces the students to how to examine the interaction within consumer and industrial marketing environments
6. Develop the students management skills related to global marketing environments.
7. Introduce the students to marketing management and research as part of the firm's strategic positioning, cultural interactions and quality considerations.

Learning Outcomes :

Upon completing the course, the student should be able to:

1. To become familiar with the range of decisions implicit in strategic marketing management and planning, and to develop skills in using a variety of analytical frameworks for making such decision.
2. To develop an understanding of how markets contrast in terms of:
    a. Their "enduring characteristics"
    b. Their stage of development and how the nature of competition in such markets is impacted
3. To enhance your understanding of what marketing managers do from new product entry strategy to international market product life cycle management and strategy.
4. To develop skill in organizing for effective strategic marketing and in implementing the market planning process.
5. To enhance your ability to communicate, in both an oral and written format, business analysis and topics.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2015, 6th edition	Pearson Prentice Hall.	Kotler and Keller	A Framework for Marketing Management

Course syllabus

Course number and code : ISE 423	**Course Name :** Special Topics in Industrial Engineering **(**Elective**)**
Teaching language: English	**Pre-requisite:** completing 125 credit hours including 54 credit hours in specialist.
Approved credit : 3 (3 + 0 + 0)	**Level:** Ninth **or** Tenth

Course Description:

In this course the students will study a special topic in the various sub-areas of industrial engineering reflecting current theory and practice. In addition, the special topics in Industrial Engineering could be selected to suit research interests of the faculty. The specific topic will be shown in the course title when it is offered and scheduled. The special topics course may be repeated as topics change.

Course syllabus

Course number and code: ISE 432	**Course Name:** Maintenance and Reliability Engineering
Teaching language: English	**Pre-requisite :** ISE 341 + MATH 265
Approved credit: 3 (3 + 0 + 1)	**Level:** Ninth

Course Description:

Introduction to the concept of reliability; Failure distributions; Reliability characteristics; Estimation of system reliability for both the independent and dependent cases; Maintenance workload analysis and calculations; Capacity planning of maintenance resources; Maintenance work scheduling; Maintenance audit and the measurement of maintenance works performance; Computerized Maintenance Management Systems (CMMS).

Topics to be covered:

No.	**List of topics**	**No. of lectures**
1.	Introduction to the concept of reliability.	4
2.	Failure distributions.	4
3.	Reliability characteristics.	8
4.	Estimation of system reliability for both the independent and dependent cases.	8
5.	Maintenance workload analysis and calculations.	8
6.	Capacity planning of maintenance resources	8
7.	Maintenance work scheduling.	8
8.	Maintenance audit and the measurement of maintenance works performance.	4
9.	Computerized Maintenance Management Systems (CMMS).	4

Course Objectives:

1. To provide students with a comprehensive understanding on various maintenance management processes.
2. To enable students to understand the impact of maintenance management on system safety, reliability and cost effectiveness.
3. To enable students to acquire knowledge and techniques in reliability engineering.
4. To equip students with necessary knowledge for proper decisions related to maintenance and reliability improvement.
5. To enable students to apply suitable maintenance techniques to engineering system.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Recognize the importance of reliability and maintenance management to public utilities, transportations, building services, etc.
2. Understand the philosophies and international compliance on safety and maintenance issues;
3. Use of common inspection methods, fault diagnosis, reliability, and hazard evaluation methods.
4. Formulate a safe, reliable, hazard-free and cost-effective managerial strategy for selected system operating in a specific public utility or industry.
5. Discuss system data collection for reliability assessment.
6. Evaluate maintenance schedules and assess the corresponding risk with appropriate techniques and tools.

Textbook and references:

Year of Publication	Publisher name	Author name	Book name
2nd Edition, 2015	Springer	Salih O. Duffuaa, A. Raouf.	Planning and Control of Maintenance Systems: Modeling and Analysis.
2nd Edition, 1997	Industrial Press	John Moubray	Reliability-Centered Maintenance
1997	McGraw-Hill	Charles E. Ebeling	An Introduction to Reliability and Maintainability Engineering

Course syllabus

Course number and code: ISE 433	**Course Name:** Maintenance Planning and Control (Elective)
Teaching language: English	**Pre-requisite:** ISE 432
Approved credit: 3 (3 + 0 + 1)	**Level :** Ninth **or** Tenth

Course Description:

The students will be introduced to maintenance systems, maintenance strategic and capacity planning, planned and preventive maintenance, work measurements and standards, material (spares) control, maintenance operations and control, planning and scheduling, maintenance quality, training, reliability-centered maintenance (RCM), total productive maintenance (TPM), intelligent maintenance systems, maintenance performance, productivity, and continuous improvement.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Maintenance systems.	6
2.	Maintenance Strategic and capacity planning.	3
3.	Preventive maintenance, concepts, modeling, and analysis.	8
4.	Maintenance work measurement.	4
5.	Maintenance material control.	4
6.	Maintenance operations and control.	6
7.	Maintenance planning and scheduling.	6
8.	Maintenance quality control.	3
9.	Computerized Maintenance Management Systems (CMMS).	2
10.	Reliability-centered maintenance (RCM).	3
11.	Total productive Maintenance (TPM).	3
12.	Intelligent Maintenance (IM).	3
13.	Maintenance system performance, productivity, and continuous improvement.	4

Course Objectives:

1. Introduce the students the concept of managing maintenance systems to achieve organizations' missions and abilities to attain their profit targets and survive in globally competitive marketplace and changing economies.
2. Introduce the student to maintenance control system which is part of the overall maintenance system and is made up of several subsystems including procedures for effective execution of planned and scheduled work, and work approval procedures based on clear standards to ensure quality.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understand that planning is a key element of maintenance management.
2. Conduct a tactical-level planning, including maintenance load forecasting and capacity planning.
3. Conduct an operational-level planning which deals with the day-to-day preparation and execution of maintenance work. Which include scheduling, work order planning, and execution.
4. Master the execution of maintenance plans which need to be monitored to ensure that the actual outcomes match the expected outcomes.
5. Understands the three elements of maintenance control which are work control, quality control, and cost control.
6. Understand that a maintenance control system is part of the overall maintenance system which is made up of several subsystems including procedures for effective execution of planned and scheduled work, and work approval procedures based on clear standards to ensure quality.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2nd Edition, 2015	Springer	Salih O. Duffuaa, A. Raouf.	Planning and Control of Maintenance Systems: Modeling and Analysis.

Course syllabus

Course number and code: ISE 444	**Course Name:** Simulation Modeling and Analysis
Teaching language: English	**Pre-requisite :** ISE 341 + ISE 321 + MATH 265
Approved credit: 3 (2 + 2 + 1)	**Level:** Ninth

Course Description:

This course Introduces the students to the concept of simulation, including system analysis, simulation modeling, simulation languages, appropriate inputs, appropriate output, and validation of the simulation model, and random number generation, Comparing alternative systems, variance reduction techniques. In addition, introduce the students to ARENA simulation language.

Topics to be covered:

No.	List of topics	No. of lectures
1	Introduction to simulation modeling.	10
2	Modeling Complex Systems.	3
3	Simulation Software.	3
4	Guided Tour Through Arena.	5
5	Modeling Basic Operations and Inputs.	8
6	Modeling Detailed Operations.	8
7	Review of Probability and Statistics.	6
8	Selecting appropriate Input Probability Distributions.	10
9	Generation of random numbers and variates	4
10	Output Data Analysis for a Single System.	10
11	Comparing Alternative System Configurations.	7
12	Variance reduction techniques.	5
13	Experimental Design, Sensitivity Analysis, and Optimization.	5

Course objectives:

1. Introduces the students to the concept of simulation, to system analysis, and to simulation modeling for simple and complex systems.
2. Introduces the students to simulation languages specifically to ARENA simulation language.

3. Introduces the students to the process of selecting appropriate inputs to a simulation model.
4. Teach the students to how to perform output from a simulation model,
5. Teach the students how to validate the simulation model.
6. Teach the students to random number generation for the stochastic variable in the simulation model.
7. Tech the student how to compare alternative systems of the simulation model.
8. Teach the students techniques to reduce variability in the simulation output.
9. Introduces the students to ARENA simulation language and utilize it to perform all the modeling and analysis for the simulation models.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Understands the difference between the stem, models, and simulation.
2. Understands the concept of simulation.
3. Ability to design and model manufacturing and service systems for all types of system (simple or complex).
4. Ability to determine the appropriate inputs to a simulation model.
5. Ability to analysis the output from a simulation model.
6. Ability to validate the model.
7. Ability to compare alternative systems based on the performance measure
8. Master the AREAN simulation language.
9. Develop AREAN model for all types of system whether simple or complex.
10. Conduct all appropriate experimentations for the model using AREAN.
11. Ability to conduct a complete simulation case study.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2015	McGraw-Hill	Averill M Law	Simulation Modeling and Analysis
2015	McGraw-Hill	W. DAVID KELTON, RANDALL P. SADOWSKI, and NANCY B. Zupick	Simulation with Arena

Course syllabus

Course number and code : ISE 452	**Course Name :** Special Topics in Systems Engineering
Teaching language : English	**Pre-requisite:** completing 125 credit hours including 54 credit hours in specialist
Approved credit : 3 (3 + 0 + 0)	**Level:** Ninth or Tenth

Course Description:

In this course the students will study a special topic in the various sub-areas of systems engineering reflecting current theory and practice. In addition, the special topics in Systems Engineering could be selected to suit research interests of the faculty. The specific topic will be shown in the course title when it is offered and scheduled. The special topics course may be repeated as topics change.

Course syllabus

Course number and code : ISE 462	**Course Name :** Manufacturing Economics (Elective)
Teaching language : English	**Pre-requisite :** ISE 361
Approved credit : 3 (3 + 0 + 1)	**Level :** Ninth or tenth

Course Description:

This course Introduces the students to the manufacturing economics, labor cost analysis, materials cost analysis, overhead cost calculations, operation cost estimating, product cost estimating, product pricing.

Topics to be covered:

No.	List of topics	No. of lectures
1	Principles, concepts and the importance of manufacturing cost analysis and estimating	4
2	Manufacturing labor cost analysis	8
3	Gross hourly labor cost analysis	4
4	Principles, concepts and the importance of manufacturing cost analysis and estimating	4
5	Materials cost policies	4
6	Production Budgeting and Performance Reports	4
7	Accounting analysis- overhead calculations	4
8	Operation cost estimating	8
9	Product cost estimating	8
10	Product pricing	8
11	Engineering contracts	4

Course objectives:

1. Introduces the students to the concept of the manufacturing economics principles and concepts.
2. Introduces the students to different methods of manufacturing labor cost analysis.
3. Introduces the students to different methods of manufacturing materials cost analysis.
4. Teach the students different ways for calculating the manufacturing overhead cost and know how to use them.
5. Teach the students the necessary knowledge about the operation cost estimating and apply various operation cost estimating techniques.
6. Teach the students the necessary knowledge about the product cost estimating and apply various product cost estimating techniques.

7. Tech the student how to apply different methods of product pricing.
8. Teach the students how to develop production budgeting and know how to write production budgeting and performance reports.
9. Introduces the students to engineering contracts and know how to write engineering contracts.

Learning Outcomes :

Upon completing the course, the student should be able to:

1. Gain the necessary knowledge about the manufacturing economics principles and concepts.
2. Understand and apply different methods of manufacturing labor cost analysis.
3. Understand and apply different methods of manufacturing materials cost analysis.
4. Know different ways for calculating the manufacturing overhead cost and know how to use them.
5. Gain the necessary knowledge about the operation cost estimating and apply various operation cost estimating techniques.
6. Gain the necessary knowledge about the product cost estimating and apply various product cost estimating techniques.
7. Understand and apply different methods of product pricing.
8. Understand production budgeting and know how to write production budgeting and performance reports.
9. Understand engineering contracts and know how to write engineering contracts.

Text book and references:

Year of Publication	Publisher name	Author name	Book name
2004	Pearson Prentice Hall.	Ostwald, P. and Mclaren, T.,	Cost Analysis and Estimating for Engineering and Management

Course syllabus

Course number and code: ISE 471	**Course Name:** Capstone Design Project (1)
Teaching language: English	**Pre-requisite:** completing 125 credit hours including 54 credit hours in specialist
Approved credit: 2 (1 + 2 + 0)	**Level:** Ninth

Course Description:

Senior students select a design project and apply learned tool and knowledge to design process, components, and/or system of the production system; Students develop work plan, identify the problem, formulate the problem through reviewing background and integrating knowledge; prepare for/or preliminary conducting of the experiments, Collect the field data, develop the mathematical model if applicable; and writing a report stating preliminary findings**.**

Topics to be covered:

No.	**List of topics**	**No. of lectures**
1.	Elements of capstone design project.	2
2.	Project planning.	2
3.	Problem review.	6
4.	Design problem formulation / experimental design.	12
5.	Preparing technical report.	4
6.	Presentation skills.	2

Course Objectives:

Prepares the senior students to carry a production design project for process, product, component, and/or system on the basis of the learned knowledge reflecting the industrial engineering program objectives.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Identify project problem and statement based on realistic needs and relative constraints.
2. Review related data, knowledge and experiences from credible sources
3. Formulate problem covering methodology of integrating knowledge drawn from previous courses and information, addressing the realistic constraints, and generating possible alternative design options and solution.
4. Develop design objectives and evaluation; it should cover design viability, evaluation criteria, and problem reformulation based on available data. [Ability to carry

computational and/or experimentations of the design project and to interpret and make decision on design issues].

5. Plan Project effectively using project planning techniques to ensure proper project timing and budgeting.
6. Communicate orally and in writing the project design details in technical report.
7. Work effectively as member of team.

Text book and references:

The text book and references will be determined according to the topic or topics that will be utilized on the Capstone Design Project (1).

Course syllabus

Course number and code : ISE 472	**Course Name :** Capstone Design Project (2)
Teaching language : English	**Pre-requisite :** ISE 471
Approved credit : 2 (1 + 2 + 0)	**Level :** Tenth

Course Description:

This course is continuation of capstone design project I, the senior students implement a production design project based on following tasks: selecting and finalizing appropriate design and/or experimental tools or mathematical/computer model**;** performing design/experiments or modeling/computation; performing analysis and evaluation of result; interpreting and drawing conclusions of results, recommendation and future work. Writing final and complete report; presenting and defending the project.

Topics to be covered:

No.	List of topics	No. of lectures
1.	Implementing project parameters and assumption.	2
2.	Carrying design calculation and /or use of experimentation tools.	8
3.	Performing parameters estimation of design and/or experiments.	12
4.	Making tradeoffs studies to refine design and/or experiments.	2
5.	Evaluating relevant constraints in particular environmental and safety issues.	2
6.	Analyzing design criteria.	2

Course objectives:

This course is intended to teach the student to learn to develop the skill of working within design team on design project and develop a real world engineering design systems.

Learning Outcomes:

Upon completing the course, the student should be able to:

1. Implement project parameters and assumptions.
2. Carry design calculation and/or use of experimental tools.
3. Carry performance parameters Estimation of design and/or experiments.
4. Carry tradeoff studies to refine design and/or experiments.
5. Evaluate of relevant constraints in particular environmental and safety issues.
6. Evaluate analysis of design criteria.
7. Demonstrate ability to communicate and achieving the project design details orally and in writing.

Text book and references:

The text book and references will be determined according to the topic or topics that will be utilized on the Capstone Design Project (2).