Course Syllabi

Course number and name	121 EngI-2 Industrial Information Systems
Credits hours	2 Credit hours
Contact hours	2 Contact hours; 2 for lecture,
Instructor name	Eng. Mohammed Alqahtani
Textbook	Laudon, K.C. & Laudon, J. P. (2018), Management Information Systems: Managing the Digital Firm (15th Ed.). Upper Saddle River, NJ: Pearson Education, Inc. (ISBN: 0-13-230461-9).
Other supplemental materials	- Lecture notes
Specific course information	
a. Catalog description	A study of issues relating to industrial information systems and strategies for organizing information technology for competitive advantage. All issues are considered from the managerial perspective using case studies as a means of exploring decision situations in organizations.
b. Prerequisite	N/A
c. Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	**CLO#1 Explain** IT infrastructure and describe the components and levels of IT infrastructure **CLO#2 Analyze** why information systems are so important today for business and management. **CLO#3 Evaluate** the impact of information systems on organizations **CLO#4 Demonstrate** how executive support systems can help senior managers make better decisions **CLO#5 Apply** the role of Internet technology in facilitating management and coordination of internal and inter-organizational business processes. **CLO#6 Exchange** the ideas by team working.

Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**:an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. **SO4:** an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
List of topics to be covered	1. Introduction to Information Systems in Engineering 2. Business Models 3. The Drivers of change 4. Information System 5. Trends in Technology 6. Information Technologies: Concepts and Management 7. Inter-Organizational Systems 8. The Web Based IT Architectures

Course number and name	222EngI-3 Engineering Statistics
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr Majdy Mostafa M. Abdel-Barr
Textbook	Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye "Probability & Statistics for Engineers and Scientists" (Ninth edition), Pearson, 2012.
Other supplemental materials	Douglas C. Montgomery and George C. Runger; "Applied Statistics and Probability for Engineers", 6th Edition, John Wiley and Sons, New York, 2013
Specific course information	
Catalog description	Description of single-variable data; organizing, displaying, and summarizing the data in measures of central tendency and of dispersion, Simple linear regression and correlation, Probability theory, and Random variables; discrete and continuous, and probability distributions; density and mass functions, are the main topics to be covered by this course.
Prerequisite	Null
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: **CLO#1**: **Arrange** and **classify** the raw data in frequency distributions and display them in graphs. **CLO#2**: **Calculate** the measures of central tendency and measures of dispersion of the sample data. **CLO#3 Determine** the regression line of the response on one controllable variable. **CLO#4: Measure** the strength of correlation between two variables. **CLO#5: Express** the results of the random experiments in sets of sample space and events. **CLO#6: Calculate** the probability of different events. **CLO#7: Determine** the probability of the random variables from the probability mass and density functions. **CLO#8: Determine** the mean and variance of the discrete and continuous random variables.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course:

	SO1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics SO3: an ability to communicate effectively with a range of audience.
List of topics to be covered	1. Introduction to the Course. 2. Description of Single-variable ungrouped data; measures of central tendency and of dispersion 3. Description of Single-variable grouped data; frequency distributions, frequency polygon and histogram and O gives, and measures of central tendency and of dispersion 4. Simple Linear Regression 5. Linear Correlation 6. Theory of Probability; sample space and events, operations on events, counting the sample points, probability of simple events, laws of probability, conditional probability, total probability and Bayes rule. 7. Random Variables and Probability Distributions; discrete and continuous random variables, probability mass and density functions. 8. Some Discrete Probability Distributions; Binomial and Poisson distributions. 9. Normal Distribution.

Course number and name	311ENGI-2 Introduction to Industrial engineering
Credits hours	2 Credit hours
Contact hours	2 Contact hours; 2 for lecture, 0 for Tutorial and 0for practical
Instructor name	Dr. Salih Altahir Almarioud Ali
Textbook	Introduction to Industrial and Systems Engineering, Turner, Wayne Mize, Joe Hecate, Kenneth E., and Nazemetz, John W. (1993).Third edition. Prentice Hall, ISBN: 0-13-481789-3.
Other supplemental materials	- Search through Google for related topics
Specific course information	
a. Catalog description	This course deals with the definition of Industrial Engineering and founded, its history and its importance and areas of work, the topics that must be industrial engineer studied in addition to the knowledge of basic concepts that help the student in how to collect industrial information and access, and the possibility of handling the student with a network of information and knowledge of the tasks entrusted to the industrial engineer
b. Prerequisite	-
c. Required / Elective	Required
Specific goals for the course	
.	1. CLO#1: Define Industrial Engineering and knowledge of its history and its future. 2. CLO#2: Describe the functions of the industrial engineer in the service of society 3. CLO#3: Evaluate the functions of the industrial engineer in the service of society. 4. CLO#4: Analyze industrial information and employ that information in the ways of making decisions.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: Outcome 1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics Outcome 3: an ability to communicate effectively with a range of audiences
List of topics to be covered	This course deals with the definition of Industrial Engineering and founded, its history and its importance and areas of work, the topics that must be industrial engineer studied in addition to the knowledge of basic concepts that help the student in how to collect industrial information and access, and the possibility of handling the student with a network of information and knowledge of the tasks entrusted to the industrial engineer.

Course number and name	312EngI-3 Industrial and Project Management
Credits hours	3 Credit hours
Contact hours	3 Contact hours; 3 for lecture, 0 for Tutorial and 0 for practical
Instructor name	Dr Ali Mohammad Medawi
Textbook	- Project Management: A Managerial Approach, Jack R. Meredith, Samuel J. Mantel, Jr., Scott M. Shafer, 2014, Ninth Edition, John Wiley & Sons, Inc.
Other supplemental materials	- A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fifth Edition, Project Management Institute, 2013 - Harold R. Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 11th edition, John Wiley and Sons, 2013. - Martinelli, R. (2016). Project management Toolbox: Tools and techniques for the practicing project manager (2nd ed.) Wiley. - Lecture notes.
Specific course information	
Catalog description	This course will introduce the project management concept and project life cycle in the first week. We will be in a journey during this course starting from the context of project initiation by focusing on strategic management and project selection, project manager's roles and responsibilities, managing conflict and negotiation and establishing the project organization. Then, we will move to discover the essential of planning the project organizations in terms of activities, costs, risks, resources and schedule. After that, we will discuss the project execution throughout monitoring, controlling and auditing. Finally, this course will end up with the project termination.
Prerequisite	-
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO1: Organization strategy management and project selection criteria. CLO2: The benefits of using network techniques for project schedule planning.

	CLO3: How to use PERT and CPM project scheduling methods. CLO4: The critical path method of crashing a project. CLO5: Negotiation, conflicts and leadership management for the project team. CLO6: Organizational structure and culture. CLO 7: Project termination steps and final report. CLO8: Characteristics of Effective Project Managers and Project Team Members. CLO9: The planning-monitoring-controlling cycle at work in project execution. CLO10: Project Initiation, Project Planning, Project Execution and Project Termination.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. **SO3**: An ability to communicate effectively with a range of audiences **SO5**: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
List of topics to be covered	Chapter 1: Introduction and Projects in Contemporary Organizations. Chapter 2: Strategic Management; The Nature of Project Selection Model. Chapter 3: The Project Manager. Chapter 4: Managing Conflict and the Art of Negotiation. Chapter 5: The Project in the Organizational Structure. Chapter 6: Project Planning; Project Activity and Risk Planning. Chapter 7: Budgeting: Estimating Costs and Risks. Chapter 8: Scheduling; Terminology and terms. Chapter 9: Resource Allocation; Critical Path Method. Chapter 10: Monitoring and Information Systems; Terms. Chapter 11: Project Control. Chapter 12: Project Auditing. Chapter 13: Project Termination; Critical Success Factors.

Course number and name	321 ENGI-3 Operations Research (1)
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr Alaa Masrahi
Textbook	Taha, H., "Operations Research: An Introduction", 7th edition, Prentice Hall, 2003.
Other supplemental materials	Lecture notes
Specific course information	
Catalog description	This is an introductory course in the methods, principles and fundamentals of operations research. Operations research applies the scientific method to problems of management and engineering. A primary characteristic of operations research is the formulation and solution of mathematical models to describe a decision-making environment. A second characteristic is the search for optimal solutions to these decisions. In particular, the course focuses on mathematical programming techniques such as linear programming (the Simplex Method, concepts of duality and sensitivity analysis), network optimization, transportation and assignment problems.
Prerequisite	---
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO#1 Explain and introduce the knowledge of the principle models used in operations research CLO#2 Identify the scientific method to problems of management and engineering CLO#3 Evaluate and formulate, and construct, the problems of management and engineering CLO#4 Calculate and solve mathematical models of decision problems

	CLO#5 apply the methods and techniques of operations research to solve meaningful real world problems. . CLO#6 Effectively communicate the assumptions, constructs, and results of simulation models and experiments with stakeholders
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. SO2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. SO6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
List of topics to be covered	Formulate mathematical models of complex systems. Solve the optimization models by using graphical methods. Use the simplex method (and its extensions) for solving linear programs. Sensitivity Analysis Duality and post-optimal analysis. Transportation Problem / Assignment Model Network models

Course number and name	323 EngI-3 Simulation of Industrial Systems & Queuing Theory
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr Alaa Masrahi
Textbook	Sheldon M. Ross, "Simulation", Fourth edition by academic press New Jersey, 2007.
Other supplemental materials	Taha, H., "Operations Research: An Introduction", 7th edition, Prentice Hall, 2003. Lecture notes
Specific course information	
Catalog description	This course explores the concepts and methods of queuing theory and the steady-state equations of the different models of queuing systems. The course deals also with the concepts of simulation systems, generation of random numbers, construction of simulation models, programming languages and evaluation of models. In addition, the course has a practical part in which ready to use computer software can be used.
Prerequisite	**222- EngI**
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO#1 Define the Principles and concepts of Queuing models, simulation modeling and formulate the mathematical models. CLO#2 Apply the principles and concepts of simulation in solving problems of industrial engineering. CLO#3 Formulate the industrial problems and the analytical procedures to find the right solution. CLO#4 Ability of students to apply basic knowledge of mathematics in computing. CLO#5 Ability to develop valid and effective models of real or conceptual systems. CLO#6 Ability to develop valid and effective models of real or conceptual systems

	CLO#7 Utilize existing computer software to solve different types of problems CLO#8 Effectively communicate the assumptions, constructs, and results of simulation models and experiments with stakeholders.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1: ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. SO2: ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
List of topics to be covered	- Probability & Statistics - Introduction to queuing systems. - Generalized Poisson queuing models. - Specialized Poisson queues. - Single-server queuing systems. - Multiple-server queuing systems. - Basic Concept of Simulation Modeling. - Random Number and Variate Generation &Problems on Monte-Carlo Simulation. - Introduction to Input Distributions -Simulation of Single Server Queuing System. -Simulation Software.

Course number and name	412 EngI-2 Production Planning and Control
Credits hours	2 Credit hours
Contact hours	4 Contact hours; 2 for lecture, 2 for Tutorial
Instructor name	Dr Omar Bafakeeh
Textbook	Heizer J., and Render B., Munson C., Operations Management: Sustainability and Supply Chain Management, Student Value Edition (12th Edition)
Other supplemental materials	- Lecture notes - YouTube
Specific course information	
Catalog description	This course focuses on the design, operation and control of production systems. The goals of the course are to increase the student understanding of the problems and opportunities faced by the operations managers in manufacturing and service organizations, to develop the student ability to apply operations management concepts in a variety of settings, and to develop the student understanding of operations management techniques in order to be able to evaluate recommendations made by technical specialists in the field.
Prerequisite	
Required / Elective	Required
Specific goals for the course	

Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: 1. Develop various operating cost components and business strategies for operations management. 2. Develop and analyze operations performance measurements and analysis for continuous improvement. 3. Describe and determine the effect of product, process, inventory costs, product forecasting, operations strategies, and schedule design parameters on design of materials requirements planning, inventory planning, capacity planning, and production planning/control systems. 4. Apply and analyze forecasting models to develop business enterprise forecasts for product demand, profits, sales, material requirements, capacity requirements, etc. 5. Identify the impact of production/inventory cost decisions and operations strategies on the break-even, return on investment and profit analysis of a business enterprise. 6. Develop and analyze production and inventory planning/control systems, and scheduling techniques by using engineering techniques for a complete production facility. 7. Perform and analyze methods of evaluating operations location alternatives. 7. Develop and analyze the capacity planning process. Identify characteristics and relationship to business operations in regard to managing product demand versus product capacity.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: 1- an ability to identify, formulate and solve complex engineering problems by applying principles of engineering science and mathematics. 2- an ability to apply engineering design to produce solution that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors. 3- an ability to communicate effectively with a range of audiences
List of topics to be covered	1. Operations and Productivity 2. Operations Strategy in a Global Environment 3. Forecasting 4. Managing Quality 5. Inventory Management 6. Aggregate Planning and S&OP 7. Material Requirements Planning (MRP)

Course number and name	413 EngI-3 Operation Research-2
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 forTutorial and 2 for practical
Instructor name	Dr Syed Noorul,Hasan
Textbook	Operations Research: An introduction (9th edition) 9th edition by Hamdy .A. Taha (author)
Other supplemental materials	Lecture notes
Specific course information	
Catalog description	The course aims to provide the student with the basic concepts required to understanding and solving operation research problems applied on engineering. Concepts and definitions of dynamic programming, Integer Programming. Non- linear programming, Markov Analysis and Concepts of Networking.
Prerequisite	Introduction to Operation Research (EngI- 321)
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO#1Explain the principles of the new theories, concepts, and analytical procedures in industrial operations research. CLO#2Analyze problems involving Cognitive skills through thinking and problem solving. CLO#3Evaluate Numerical skills through application of knowledge in basic mathematics. CLO#4Calculate. Students will be able to apply the principles and concepts of industrial operations research that they have learnt in this course in solving problems of industrial engineering. CLO#5 Apply the method and becomes responsible for their own learning through solutions of assignments.. CLO#6 Exchange the idea by working in teams
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1:an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

	SO6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
List of topics to be covered	(1)Introduction-concept of operations research-2 (2)Dynamic programming. (3)Markov's Analysis and Markov's Chain (4)Integer programming. (5)Non - Linear Programming (6)Network Analysis

Course number and name	313 ENGI-3 Work Study
Credits hours	3 Credit hours
Contact hours	3 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr. Salih Altahir Almarioud Ali
Textbook	- Barnes, R., 1980; Motion and Time Study, 7th edition, John Wiley and Sons, New York. - Konz, S., and Johnson, S., 2000; Work Design: Industrial Ergonomics, 5th edition, Holcomb Hathaway, Scottsdale, Arizona
Other supplemental materials	- Myers, F. and Stewart, J., 2002; Motion and Time Study for Lean Manufacturing, 3rd edition, Prentice Hall, New Jersey - Niebel, B., 1988; Motion and Time Study, 8th edition, Irwin, Homewood, Illinois
Specific course information	
a. Catalog description	1. One of the objectives of this course is to build a deep consciousness of the need for constant improvement in manufacturing and service operations. 2. This course will teach students about the time-tested successful tools that industrial engineers use to improve operations and activities. 3. This course will also introduce them to the various methods to obtain a time standard for a job and when each method is appropriate. 4. Finally, an objective of this course is to show the student that motion and time study is vital for service industries as well as manufacturing
b. Prerequisite	-
c. Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: . CLO#1: Students must understand the basic requirement of Work Study that they should know how method study is done and then how work is measured.

	. CLO#2: They should be able to do the work normally assigned to a worker, recognize the limitations, identify the skills required, and design an improved method of doing the same workCLO#3: Team members are expected to help each other in a Lab experiment . CLO#4: Teaching strategies include practical application of knowledge acquired
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: Outcome 1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics Outcome 6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
List of topics to be covered	1. Introduction 2. Productivity and Work Study and Relationship 3. Work Study: Method Study and Work Measurement 4. Basic Procedure of Work study 5. Outline Process Chart: Flow Process Chart: Flow Diagram 6. Operations Analysis: Total Time of Job (6 hours) 7. Time Study 8. Proposed Method Implementation 9. Performance Rating and Allowances 10. Work Sampling

Course number and name	322EngI -3 Quality Control
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr. Abdulrahman Albar
Textbook	Douglas C. Montgomery, Introduction to Statistical Quality Control, 7th Edition
Other supplemental materials	- Articles - Lecture notes
Specific course information	
Catalog description	Introduction to quality systems. Cost of quality. Quality systems and standards: six sigma and ISO. Statistical process control: control carts for variables and attributes, process capability analysis, sampling.
Prerequisite	ENGI 222
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO1: be able to define, quality control, statistical quality control, and total quality management. CLO2: describe the necessary management activities to implement a TQM program. CLO3: be able to construct a Pareto diagram, cause and effect diagram, and know the major sections of ISO 9000; know the techniques and procedures of internal audits. CLO4: be able to understand the fundamentals of statistics. CLO5: Know the purposes and construction of control charts for attributes. CLO6: Know the basic theorems of probability. CLO7: Know the purposes and construction of control charts for variables.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: The following student outcomes are addressed by the course: SO1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

	SO3: An ability to communicate effectively with a range of audiences
List of topics to be covered	1. Introduction to Quality 2. Problem Solving Methods 3. Statistical Methods in Quality Control and Improvement 4. Analysis of Convection Heat Transfer 5. Methods and Philosophy of Statistical Process Control 6. Control Charts for Variables and Attributes 7. Process Capability

Course number and name	330EngI -2 Special Applications
Credits hours	2 Credit hours
Contact hours	3 Contact hours; 2 for lectures
Instructor name	Dr. Abdulrahman Albar
Textbook	Diversity of Corporates Annual Business Reports (i.e AlMarai Company)
Other supplemental materials	- Case Studies
Specific course information	
Catalog description	Introduction to reading business annual report, corporate structure, corporate business model, corporate revenues, corporate expenses, market share.
Prerequisite	N/A
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO1: Familiarize the student with real companies' annual performance report. CLO2: knolwedge of contemporary issues CLO3: an ability to use the techniques, skills, and moderen engineering tolls nessessary for engineering practices CLO4: an ability to communicate effectively
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO3: An ability to communicate effectively with a range of audiences SO3: An ability to acquire and apply new knowledge as needed using appropriate learning strategies.
List of topics to be covered	1. Introduction to Corporate Annual Report 2. Case Studies. 3. Corporate Comparison

Course number and name	421 EngI-4 Human Factors Engineering
Credits hours	4 Credit hours
Contact hours	6 Contact hours; 3 for lecture, 1 for Tutorial, and 2 for practical
Instructor name	Dr Abdulrahman Khamaj
Textbook	-Stone, N. J., Chaparro, A., Keebler, J. R., Chaparro, B. S., & McConnell, D. S. (2017). Introduction to Human Factors: Applying Psychology to Design. CRC Press. -Kortum, P. (2016). Usability assessment: How to measure the usability of products, services, and systems. Human Factors and Ergonomics Society.
Other supplemental materials	-Lecture notes -Case studies
Specific course information	
Catalog description	This course introduces students to the scientific foundations, principles, and applications of human factors and ergonomics with a focus on the design of human work. Class periods will be used for a combination of lecture, discussion and activity. It is expected that all students will be prepared and will participate in these classroom learning opportunities. Students are also expected to do a small-scale project and engage in out-of-class learning activities including laboratory exercises, preparatory readings, and online activities.
Prerequisite	232 EngI-3
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: **CLO#1 Describe** the role and benefits of human factors & Ergonomics in the workplace. **CLO#2 Explain** the required principles for the effectiveness of visual displays. **CLO#3 Examine** the usability of system interfaces using any in-class discussed assessment technique. **CLO#4 Determine** usability problems, causes, and solutions. **CLO#5Analyze** human errors using in-class discussed taxonomy.

Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO2**: An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. **SO3**: An ability to communicate effectively with a range of audiences. **SO5**: An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
List of topics to be covered	1. Introduction to Human Factors and Ergonomics 2. Introduction to Human Factors and Ergonomics 3. Human Errors 4. Design of Everyday Things 5. Introduction to usability 6. Display of Information 7. User Testing 8. Focus Groups 9. Heuristic Evaluation 10. User Interface Design Principles

Course number and name	422ENGI-3 Manufacturing Processes 2
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr Omar Bafakeeh
Textbook	- Manufacturing Engineering and Technology (4th edition) Kalpakjian & SchmidAnthony E. - Fundamentals of modern manufacturing materials processes and systems 4th by Mikell P. Groover
Other supplemental materials	- Handbook of advanced ceramics machining by Ioan D. Marinescu - Lecture notes - Youtube
Specific course information	
Catalog description	This course introduces metal cutting processes, chips formation. In addition, this course introduces the cutting processes conditions, parameters, cutting tools and tools life.
Prerequisite	251EngI
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: 1- understand of the principles of the major manufacturing processes 2- able to recognize the standard processes used to produce products 3- select the optimal process to produce product **4**- have the ability to operate a drill press, mill, and lathe

Student outcomes that addressed by the course	The following student outcomes are addressed by the course: 1- an ability to identify, formulate and solve complex engineering problems by applying principles of engineering science and mathematics. 2- an ability to apply engineering design to produce solution that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors. 3- an ability to communicate effectively with a range of audiences 4- an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusion.
List of topics to be covered	- Metal cutting - Chip formation - Cutting tools - Rounded shapes - Machining various shape - Abrasives machining - Introduction to non-conventional dressing

Course number and name	423EngI-3 Inventory Control and Material Handling
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 forTutorial and 2 for practical
Instructor name	Dr. Ahmed A. M. Bayoumi
Textbook	1- Max Muller, "Essential of Inventory Management", 2002, 2- Tony Wide, "Best Practice in Inventory Management, Second Edition, 2002.
Other supplemental materials	Notes and slides given and explained in class
Specific course information	
Catalog description	This course is considering the concepts of the inventory planning and control of the raw materials, spare parts, and the other production requirements, also design of the inventory systems, material handling techniques in the factories, material handling equipments and its design and study of material handling transporting systems. .
Prerequisite	Non
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: By the end of this course, the student should be able to: **CLO1**: Define inventory, storage systems and methods of materia handling **CLO2**: Describe different types of inventory models, materia handling equipment. **CLO3**: Develop the material storage system **CLO4**: Analyze and design the main components of materia handling equipment **CLO5**: Evaluate different methods related to storage systems and material handling. **CLO6**: Manage workloads and time effectively

Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. SO2: An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. SO6: An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
List of topics to be covered	- An Introduction to Inventory control - Analysis of storage systems - Determine the storage costs and storage methods. - Assess the level of performance of the stock - Determine the economic batch size, and reorder and the safety quantity. - Material requirements planning, and energy and resources. - ABC analysis models - Introduction to material handling equipment - Transport and lifting materials - Selection of lifting equipment and parts such as rope and pulleys, chains

Course number and name	424EngI-2 Cost Analysis &Value Engineering
Credits hours	2 Credit hours
Contact hours	2Contact hours; for lecture
Instructor name	Dr walid shewakh
Textbook	- Management Accounting for business By Collin Drury, Publisher: Thomson Learning 2005
Other supplemental materials	- Course Notes: First day materials - Lecture notes - Riggs,H.," Finanical and Cost Analysis for Engineering and Technological Management " , J.W.&Jons , 1995 -
Specific course information	
Catalog description	This course is an introduction to the industrial costs. Topics covered include introduction to cost analysis and management accounting .Cost terms and methods of estimations. Cost terms and purposes. Cost-Volume-Profit Analysis Measuring Relevant Costs and Revenue for Decision Making. Distinguish between Cost Determination and Cost allocation Processes. Introduction to Value Engineering and Value Calculation. Introduction to Cost Analysis and Management Accounting.
Prerequisite	Non
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: 1- Understand the Concept of Cost Analysis, 2- Cost Terms and Management Accounting. 3- Calculate and apply Cost-Volume-Profit Analysis. 4- Calculate and explain the Cost-Activity based Costing. 5- Understand the Concept of Break Even Point and apply accordingly in solving problems. 6- An Ability to use the Techniques, Skills and Modern Engineering Tools Necessary for Cost Decision Practices. 7- Understand the Concept of the Value Engineering, Value Analysis and Value Calculation.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

	SO5: an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
List of topics to be covered	1. Introduction to Cost Analysis and Management Accounting 2. Introduction to Cost Terms 3. Cost- Volume- Profit Analysis 4. Measuring Relevant Costs and Revenue for Decision Making 5. Distinguish between Cost Determination and Cost allocation Processes 6. Introduction to Value Engineering and Value Calculation 7. Introduction to Cost Analysis and Management Accounting 8. Introduction to Cost Terms

Course number and name	425EngI -2 Industrial Safety and Health
Credits hours	2 Credit hours
Contact hours	2 Contact hours; 2 for lectures
Instructor name	Dr. Majed Moosa
Textbook	Goetsch, D. L. (2011). Occupational safety and health for technologists, engineers, and managers (7th ed.). Upper Saddle River, NJ: Pearson.
Other supplemental materials	OSHA standards Lecture notes
Specific course information	
Catalog description	Fundamentals of industrial safety and health are studied to provide industrial engineers with the knowledge to effectively incorporate design solutions for health and safety considerations in the workplace. Human capabilities and limitations in the industrial workplace are also assessed and taken into account when implementing design solutions. Topics include: machine guards, confined space protocol, accident losses, prevention, liabilities and, the OSHA Act, and related standards and codes. Also addressed are ergonomic issues such as the design of the workplace and environment, design of display and control systems and human factors in expanding technology.
Prerequisite	N/A
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: **CLO#1** Identify and solve health and safety problems **CLO#2** Understand and apply related standards, legislations and best practices at varied workplaces. **CLO#3** Anticipate, identify, evaluate and control different types of hazards using Risk Management principles. **CLO#4** Identify trends and concerns in the workplaces through collecting, managing and interpreting related information and data.

	CLO#5 Design and evaluate a variety of health and safety programs to implement them for different tasks. **CLO#6** Recognize ethical and professional responsibilities and practice in the field of health and safety **CLO#7** Fully understand the importance and impact of safety and health results in a universal context. **CLO#8** Understand the nature of health and safety in Saudi Arabia and compare it to other countries. **CLO#9** Calculate the total cost for workplace accidents
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. **SO2**: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. **SO3**: An ability to communicate effectively with a range of audiences. **SO7**: An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
List of topics to be covered	1. Safety and Health Movement, Then and Now 2. Accidents and Their Effects 3. Accidents Costs 4. Theories of Accident Causation 5. The OSH Act, Standards, and Liability 6. Accident Investigation and Reporting 7. Hazard Analysis/Prevention and Safety Management 8. Risk Assessment 9. Ergonomic Hazards 10. Mechanical Hazards and Machine Safeguarding 11. Falls Hazards 12. Electrical Hazards 13. Stairways and Ladders Hazards 14. Fire Hazards and Life Safety 15. Industrial Hygiene and Confined Spaces

Course number and name	511EngI-2 Engineering Reliability and Maintenance
Credits hours	2 Credit hours
Contact hours	4Contact hours; 2 for lecture, 1 for Tutorial and 1 for practical
Instructor name	Dr walid shewakh
Textbook	- S.O. Duffuaa and A. Raouf, Planning and Control of Maintenance Systems, Springer International Publishing Switzerland 2015
Other supplemental materials	- Course Notes: First day materials - Lecture notes - B.S. Dhillon ; (***Maintainability, Maintenance, and Reliability for Engineers*** **),** Taylor & Francis Group, LLC, 2006**.**
Specific course information	
Catalog description	This course illustrates the fundamental concepts, the necessary knowledge and the basic skills related to systems reliability and systems maintenance function. The course intends to expose the students to the concept of reliability and to help them learn the techniques of estimating reliability and related characteristics of components/ systems. Moreover, it exposes them to the necessary engineering techniques used for analyzing, planning and controlling maintenance systems
Prerequisite	Non
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: 8- Gain the necessary knowledge about the types of maintenance and know how to use them when design maintenance systems. 9- Operate and control a maintenance system. 10- Estimate and forecast the maintenance load. 11- Explain and design complete maintenance system based on maintenance planning 12- Understand the computerized maintenance management systems 13- Explain fundamentals of reliability analysis. 14- Model and analyze reliability problems. 15- Study static reliability models: Series systems 16- Study dynamic reliability models and solve various dynamic reliability problems

Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics **SO5:** an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
List of topics to be covered	9. Introduction to Maintenance 10. Maintenance Systems Control 11. Modeling of Maintenance Processes 12. Computerized Maintenance 13. Management System (CMMS) 14. Maintenance Planning and Scheduling 15. Introduction to Reliability Engineering 16. Reliability Mathematics 17. General Reliability Analysis Formulas 18. Reliability Networks 19. Reliability Evaluation Tools

Course number and name	512 EngI- 2 Environmental Engineering
Credits hours	2 Credit hours
Contact hours	2 Contact hours; 2 lecture.
Instructor name	Dr Syed Noorul Hasan
Textbook	Bishop, P.L. (2004) Pollution Prevention: Fundamentals and Practice. Waveland Press, Inc
Other supplemental materials	. Lecture notes
Specific course information	
Catalog description	This course will involve management of municipal, agricultural, industrial wastes, water pollution, and air pollution, soil pollution, and Noise pollution. It will also deal with control and prevention of pollution in the total environment using a holistic approach. Waste treatment and disposal methods with emphasis on bio-treatment, bio-conversion, resource recovery and recycling, waste minimization techniques.
Prerequisite	
Required / Elective	None
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO#1Explain the principles of the basic sources of environmental pollution CLO#2Analyze problems involving the interactive effects of the various sources of pollutants CLO#3Evaluate and quantify the degree of pollution in the environment CLO#4Calculate and Propose strategies for environmental pollution control CLO#5 Apply to Apply different techniques to wastes from different sources, the method known in existing global environmental regulations, CLO#6 Exchange the idea by working in teams
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1:an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

	SO2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. SO6:an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
List of topics to be covered	(1)Introduction to Environmental Engineering (2) Introduction to Pollution Prevention (3) Properties and Fates of Environmental Contaminants (4) Industrial Activity and the Environment AIR POLLUTION CONTROL SOLID WASTE MANAGEMENT HAZARDOUS WASTE MANAGEMENT WATER QUALITY MANAGEMENT ENERGY USAGE RESOURCE DEPLETION (5) Improved Manufacturing Operations (6)Pollution Prevention And Control Strategies (7) Pollution Prevention Planning

Course number and name	513EngI-2 Analysis of Industrial Operations
Credits hours	2 Credit hours
Contact hours	2 Contact hours; 2 lecture.
Instructor name	Dr Syed Noorul Hasan
Textbook	1- Dan & Nada R. Operations Management An Integrated Approach Fourth Edition, Wiley 2011 2- Russell,R.& Tylor,B.W."Operations Management " , Prentice-Hall, 2000
Other supplemental materials	. Lecture notes
Specific course information	
Catalog description	This course deals with the Basic concepts and principles of Industrial Operations, operations analysis, product analysis, considerations and criteria of product analysis, process analysis, types of manufacturing systems and production control methods.
Prerequisite	EngI – 422
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO#1Explain the principles of basic concept of Industrial operations. CLO#2Analyze products and processes CLO#3Evaluate and develop the product specifications and design CLO#4Calculate workloads and time effectively CLO#5 Apply written, oral and graphical presentational skills.

	CLO#6 Exchange and Communicate effectively the idea by working in teams
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. SO4: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
List of topics to be covered	(1) Introduction to operation analysis &management (2) Characteristics of operation decisions (3) Operations strategy & competitiveness (4) System design & capacity (5) Product development and analysis

Course number and name	514 EngI-3 Computer Aided Manufacturing
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr Refaay Ahmed
Textbook	- Automation, Production Systems, and Computer-Integrated Manufacturing. Fourth Edition. Mikell P. Groover 2015
Other supplemental materials	- THIRD EDITION Programming of Computer Numerically Controlled Machines. Ken Evans INDUSTRIAL PRESS INC. 2007. - Introduction to Computer Numerical Control Michael Kelly SOLAS 2014 - Lecture notes
Specific course information	
Catalog description	This course illustrates the basic concepts of using computer hardware and software in manufacturing systems
Prerequisite	422EngI
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO#1: The student will demonstrate knowledge of manufacturing processes CLO#2: The student will demonstrate knowledge of designing for manufacturability CLO#3: The student will demonstrate a knowledge of Computer Aided Manufacturing CLO#4: The student will demonstrate knowledge of integration of manufacturing elements CLO#5: The student will demonstrate a knowledge of product development
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. SO2: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health,

	safety, and welfare, as well as global, cultural, social, environmental, and economic factors. SO6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
List of topics to be covered	**1-** Exploring manufacturing processes and systems. **2-** Explain the difference between primary and secondary manufacturing processes **3-** Analyze a product to propose the manufacturing processes used to create it **4-** Differentiating between the various types of manufacturing processes **5-** Demonstrating knowledge of the design process **6-** Using solid modeling software to improve a flawed design **7-** Determining whether a product is safe for a given audience. **8-** Creating a product using solid modeling software. **9-** Explaining the machine definitions used for CAM. **10-** Creating a Toolpath for the CAM model. **11-** Checking toolpath operations for accuracy. **12-** Determining the appropriate speed rate for a given material using a tool with a given diameter **13-** Determining the feed rate for a given material using a tool with a given diameter **14-** Transferring the drawings made in CAD to a CAM program **15-** Creating numerical code using a CAM program

Course number and name	521EngI -3 Automatic Control Systems and Robotics
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr. Majed Moosa
Textbook	MODERN ROBOTICS MECHANICS, PLANNING, AND CONTROL Kevin M. Lynch and Frank C. Park, 2017
Other supplemental materials	Craig, J.J.: Introduction to robotics: mechanics and control. Addison-Wesley New York, 1989. (3rd edition 2006) Samuel Bouchard: Lean Robotics: A Guide to Making Robots Work in Your Factory Lecture notes
Specific course information	
Catalog description	Fundamentals of industrial robotics are studied to provide industrial engineers with the knowledge to effectively incorporate design solutions for Automatic Control Systems and Robotics considerations in the industry. Human and robots' capabilities and limitations in the industrial workplace are also assessed and taken into account when implementing design solutions. Topics include: spatial descriptions, manipulators, kinematics, robot control, and dynamics
Prerequisite	328EngM-3
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	**By the end of this course, the student should be able to:** **CLO#1** Identify the different types of Robotic systems. **CLO#2** Select the suitable robot type to deal with the required industrial tasks. **CLO#3** State the important kinematic variables affecting the workspace of each robot type. **CLO#4** Select the suitable robot actuators and sensors. **CLO#5** Know the concept of lean robotic **CLO#6** Design an industrial robot **CLO#7** Select the suitable robot programming type. **CLO#8** State the different standard frame in and around the robot workspace.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. **SO2**: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health,

	safety, and welfare, as well as global, cultural, social, environmental, and economic factors. **SO3**: An ability to communicate effectively with a range of audiences. **SO4**: An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
List of topics to be covered	1. Automatic Control Systems 2. Introduction to robotics 3. Robot key components and applications 4. Sensors and Robot Programming 5. Robot Configuration 6. Robotic Cells 7. Configuration Space 8. Robot's Kinematics 9. Lean Robotics 10. Deploying Robotic Cells 11. Manual Task Mapping 12. Robotic Task Mapping 13. Robotic Design: Lean Robotics in Action 14. Robot operation and Control 15. Advanced Topics in Robotics 16. Robotics in different Industries

Course number and name	522EngI-3 Plant Layout and Site Location
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr. Majed Moosa
Textbook	Tompkins, et.al. (2010). Facilities Planning (4th ed.). Hoboken NJ: John Wiley & Sons.
Other supplemental materials	Lecture notes
Specific course information	
Catalog description	Fundamentals of facilities planning are studied to provide industrial engineers with the knowledge to effectively incorporate design solutions for Plant Layout and Site Location in any industry. Human and computer capabilities and limitations in the industrial sites are also assessed and taken into account when implementing design solutions. Topics will include: material handling, storage facilities, layout planning and product design.
Prerequisite	N/A
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO#1 Describe the concepts of facilities location and layout (Comprehension) CLO#2 Identify various factors for site selection and layout (Comprehension) CLO#3 Design different types of location and layout (Synthesis) CLO#4 Solve problems on location, layout, and balancing (Application) CLO#5 Propose techniques for optimal location and layout of organizations (Synthesis)
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. **SO2**: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. **SO3**: An ability to communicate effectively with a range of audiences.

List of topics to be covered	17. Introduction to Facilities Planning 18. Strategic Planning for Facilities 19. Facilities Location Methods 20. Product Design 21. Process Design 22. Schedule and Facilities Design 23. Flow - Space Systems 24. Activity relationships 25. Basic layout designs 26. Personal Planning 27. Material Handling 28. Warehouse Operations 29. Layout Planning 30. Manufacturing Systems

Course number and name	523EngI -2 Productivity Measurements
Credits hours	2 Credit hours
Contact hours	3 Contact hours; 2 for lecture, 1 for Tutorial
Instructor name	Dr. Abdulrahman Albar
Textbook	Darlene, Lames, and Loan, Fundamentals of Performance Improvement: Optimizing Results through People, Process, and Organizations, 3rd Edition
Other supplemental materials	Bernard Marr, Key Performance Indicators, The 75 Measures Every Managers Needs to Know, Pearson
Specific course information	
Catalog description	Introduction to performance measurements, performance measurements frameworks, Key Performance Indicators in financial aspects, Customer aspects, Sales and marketing aspects, Operational and supply chain aspects, Employee aspects, Corporate social responsibility aspects.
Prerequisite	ENGI 311
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: CLO1: know the basis of implementing performance measurement systems CLO2: Know the purposes and importance of KPIs. CLO3 Know perofrmance measuremnts applications in different organizational aspects CLO4: be able to perform performance measurement calculation
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: SO1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. SO3: An ability to communicate effectively with a range of audiences

List of topics to be covered	1. Introduction to Performance Measurement 2. Performance Measurements in Financial Aspects 3. Performance Measurements in Customer Aspects 4. Performance Measurements in Sales and marketing Aspects 5. Performance Measurements in Operational and supply chain Aspects 6. Performance Measurements in Employee Aspects 7. Performance Measurements in Corporate social responsibility Aspects 8. Performance Measurement Case Studies

Course number and name	524EngI-3 Analysis and Design of Industrial Systems
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 for Tutorial and 2 for practical
Instructor name	Dr Majdy Mostafa M. Abdel-Barr
Textbook	Hans P.M. Veeke, Jaap A. Ottjes, and Gabriël Lodewijks.; "The Delft Systems Approach: Analysis and Design of Industrial Systems", Springer-Verlag London Limited, 2008.
Other supplemental materials	Joseph S. Valacich, Joey F. George, and Jeffrey A. Hoffer; "Essentials of Systems Analysis and Design"", 5th Edition, Pearson Education Inc., US, 2012. Jeffrey A. Hoffer, Joey George and Joseph A. Valacich, "Modern System Analysis and Design", 7th edition, Prentice Hall, 2013. Lecture notes
Specific course information	
Catalog description	Overview on Industrial and Systems Engineering, Systems, system concepts, and principles of system thinking, Traditional system development life cycle, System Investigation; techniques and tools, System analysis; Conceptual mode, System Design; evaluation of design alternatives, Real projects for system analysis and design.
Prerequisite	513 EngI-2
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: **CLO#1**: **Define** and **analyze** the needs of and problems encountered by the system constituencies. **CLO#2**: **Analyze** the required processes and **define** their interrelationships. **CLO#3**: **Classify** the processes within the systems into executing, supporting, and controlling processes **CLO#4: Develop** alternative designs for the required system. **CLO#5:** Provide oral and written presentations for the life project. **CLO#6: Define and analyze** the ethical, environmental, financial, regulatory, and economic constraints on the problem solutions. **CLO#7: Evaluate** the alternative designs considering the technical, economic, ethical, and environmental factors. **CLO#8:** Develop plans for investigating, analysis, and design a system in a life project through teamwork.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO2**: an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

	SO3: an ability to communicate effectively with a range of audience**.** **SO4**: an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. **SO5:** an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
List of topics to be covered	20. Overview on Industrial and Systems Engineering. 21. Concepts and Terminology of Systems and System Design. 22. Traditional System Development Life Cycle – SDLC: system investigation, analysis, design, development, implementation, and improvement phases. 23. Techniques and Tools of System Investigation. 24. Models for Structuring of Processes. 25. Conceptual Model for the Analysis of Industrial Systems. 26. System Design. 27. System Evaluation. 28. Projects.

Course number and name	525EngI-2 Design of Industrial Experiments
Credits hours	2 Credit hours
Contact hours	2 Contact hours; 2 for lecture.
Instructor name	Dr Majdy Mostafa M. Abdel-Barr
Textbook	Montgomery Douglas C.; "Design and Analysis of Experiments", 6th Edition. John Wiley and Sons, New York, 2005.
Other supplemental materials	Montgomery Douglas C.; "Applied Statistics and Probability for Engineers", 5th Edition, John Wiley and Sons, New York, 2010 Jiju Antony; "Design of Experiments for Engineers and Scientists", 1st Edition. Butterworth-Heinemann, 2003.
Specific course information	
Catalog description	Overview of the basics of Stat, Statistical Inference of the parameters of one and two normal populations, Analysis of Variance, Fixed effects model, Completely Randomized design, Randomized Complete Block Design, Latin Square Design, Factorial Design, Fitting the regression line models.
Prerequisite	222 EngI-3
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	By the end of this course, the student should be able to: **CLO#1**: Recognize the principles of Inferential Statistics, Analysis of Variance, and Design of Experiments. **CLO#2**: Define the sampling distributions and their characteristics. **CLO#3**: Define the designs of experiments and their applications. **CLO#4:** Compute the various sample statistics. **CLO#5:** Estimate the parameters of one or two population(s) and test the hypotheses that are concerned with their values. **CLO#6:** Analyze the variation in the experimental response and explain it by the possible sources. **CLO#7:** Formulate the hypotheses related to the effects of the various controllable factors on the response**.** **CLO#8:** Choose the most appropriate experimental design to test the hypotheses. **CLO#9**: Use the computer applications software to compute the test statistics, hypotheses testing and Analysis of Variance. **CLO#10:** Conclude the results and evaluate the truth of the set hypotheses.
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1**: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

	SO6: an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
List of topics to be covered	1. Introduction: Some typical applications of experimental designs, basic principles, using statistical techniques in experimentation. 2. Basic statistical concepts, sampling and sampling distributions, inferences about the parameters of populations. 3. The Analysis of variance: Analysis of the fixed effects model, model adequacy checking, practical interpretation of results, non-parametric methods in the analysis of variance. 4. Randomized Blocks, Latin Squares & Related designs: Randomized complete block designs, Latin Square design, balanced incomplete block designs. 5. Factorial Designs: The advantage of factorials, the two factor factorial designs, the general factorial designs, fitting response surface curves and surfaces, blocking in factorial designs. 6. Fitting Regression line models, Analysis of Variance for Regression models.

Course number and name	590ENGI-4 Graduation Project
Credits hours	4 Credit hours
Contact hours	4 Contact hours; 1 for lecture, 4 for Tutorial and 6 for practical
Instructor name	Dr. Salih Altahir Almarioud Ali
Textbook	IE Books, lecture notes, internet, etc.
Other supplemental materials	Computer-based programs/CD, professional standards or regulations and software.
Specific course information	
a. Catalog description	The purpose is to provide guidelines for the preparation of the report, which is required of B.Sc. students in the Industrial Engineering Department for graduation. General requirements: The ability to identify, defines, research, and solves an issue or problem in industrial and service organizations. To develop this, the student is required to prepare a report that examines, in detail, an issue or problem and provides recommendations or solutions for addressing the issue or solving the problem through the application of learned ideas and concepts. The subject of the report should be relevant to the theory, ideas, and practice of industrial engineering fields. The student will be examined on the project and the knowledge contained in the report.
b. Prerequisite	-
c. Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	1. CLO#1: Knowledge of basic topics related to the graduation project to understand the principles of project concept. 2. CLO#2: Learn the skills needed to accomplish the project CLO#3: Ability to plan the research project and start its implementation 3. CLO#4:The use of scientific, engineering, and knowledgeable skills in the writing
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: Outcome 1: An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

	Outcome 2 An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. Outcome 3: an ability to communicate effectively with a range of audiences. Outcome 4 An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts Outcome 5 An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. Outcome 6 An ability to develop and conduct appropriate experimentation analyzes and interprets data, and use engineering judgment to draw conclusions. Outcome 7 An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.
List of topics to be covered	1. Identification of topic and preparation of project plan/schedule. 2. Literature review - a detailed literature search should be performed to identify prior work in the topic area. 3. Clear Statement of purpose and objective of the study 4. Development of work or research methodology 5. Communication Skills; Written, graphical and Oral 6. Use of standards and design codes. 7. Data gathering, component procurement. 8. Evaluation of results and formulation of conclusions 9. Preparation of draft and final report 10. Presentation of report 11. Presentation to the projects committee for arbitration

Course number and name	515EngI -3 Computer Applications
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 3 Lab
Instructor name	Eng Mohamed Abdallah Abdelhady
Textbook	Applied numerical methods with MATLAB for engineers and scientists . 2018
Other supplemental materials	Manufacturing Engineering (1) - Lecture – Lab - exercises Manufacturing Engineering (2) - Lab - exercises Statistics - Lab Inventory control - Lab
Specific course information	
Catalog description	What is the main purpose for this course? This course is a core course in Bachelor of Manufacturing Engineering Degree Program. Purpose of the course is to provide the knowledge to students about fundamentals of MATLAB computer programming system as a problem solving tool for industrial engineering. Development of application and appropriate algorithms for solving engineering problems. It provides the student clear understanding of modeling, designing algorithms and computations using MATLAB for numerical analysis methods and engineering problems
Prerequisite	515EngI
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	CLO # 1 Create a mathematical problem solver (matrices) using the MATLAB program. CLO # 2 Compare a set of data using a graph. CLO # 5 Create a program to solve engineering problems using the MATLAB program CLO # 6 The student's ability to analyze data. CLO # 7 Student's ability to use MATLAB in engineering drawing and 3D modeling.
Student outcomes that addressed by the course	SO1: The ability to identify, formulate and solve complex engineering problems through the application of the MATLAB program SO2: The ability to identify, formulate and solve mathematical problems through the application of the MATLAB program SO7: The ability to develop factories in terms of quantitative production and the productivity of each worker separately using the MATLAB program
List of topics to be covered	1 - Ability to know the student deal with the program MATLAB.

	2-Ability to solve mathematical problems and basic science of engineering problems using by program MATLAB. 3 -Ability to design orders to study different engineering systems and analysis and interpretation of data using by program MATLAB. 4 -Ability to communicate effectively in written, oral, and graphical formats, including using by program MATLAB. 5-Ability to perform numerical and mathematical operations and curves using by program MATLAB.

Course number and name	411EngI -3 Manufacturing Engineering (1)
Credits hours	3 Credit hours
Contact hours	5 Contact hours; 2 for lecture, 1 exercises 2 Lab
Instructor name	Eng Mohamed Abdallah Abdelhady
Textbook	Fundamentals of Modern Manufacturing - 2017 - Materials, Processes, and Systems- Fourth Edition
Other supplemental materials	Computer Application in Industrial Engineering - Lecture – Lab - exercises Manufacturing Engineering (2) - Lab - exercises Statistics - Lab Inventory control - Lab
Specific course information	
Catalog description	This course provides a study of various manufacturing processes. Casting technology (Processes and methods of casting, mold materials and its properties, casting equipment's, casting defects, inspection methods, metallic mold alloys, solidification and melting, furnaces, expendable and permanent mold casting). Bulk deformation processes (hot and cold forming processes, workability and limits of forming, maximum loads). Sheet metal processes and its calculations, rolling, wire and bar drawing, deep drawing. Welding processes(arc welding, resistance welding, .. etc).
Prerequisite	none
Required / Elective	Required
Specific goals for the course	
Course Learning Outcomes (CLO)	CLO # 1 Casting and Casting Model Making. CLO # 2 Choose the type of plumbing sand used for each metal. CLO # 4 Knowing the mechanical properties of metals used in plumbing CLO # 5 Learn about the different welding types for each type. CLO # 6 Know the types of gases used for welding. CLO # 7 Rolling Mill for Slabs to Reduce Thickness
Student outcomes that addressed by the course	The following student outcomes are addressed by the course: **SO1: The ability to produce high quality castings** **SO2: The ability to know the defects of castings and repair them after the plumbing process** **SO6: The ability to choose the appropriate welding type for each metal.**.
List of topics to be covered	1. General introduction to the different manufacturing processes. 2. The basics of metal casting operations. 3. Types of furnaces used in melting metals

	4. The basics of the various welding processes 5. The advantages and disadvantages of each type of welding 6. The force required to roll all kinds of metals