Summarized Course Description

Course number: ECE 200	Course name: Academic and professional communication for Engineering
لغة تدريس المقرر : English	Pre-requisites: ENG 104
Credit hours: 3 (3-1-0)	Course level: Level 4/Year 2

Course Description   وصف المقرر :

 The first part of the program is to train students to write a 1500 word source based report on a topic in their field of study. They should develop skills such as APA style of documentation, advanced internet search and library research skills. The second part of the program is to enable Students to the world of work starting with the job hunt (job applications, cover letters, resumes, interviews) and leading to the most important aspects of business correspondence(letter formats, style, tone, inquiry, special request and complaint). The third part of the program is to Instruct on advanced presentation skills for public speaking in both academic and professional environments.

Course objectives   أهداف المقرر :

The course aims at developing the various communication skills through a series of tasks such as classroom activities, and home assignments that encourage engineering students to combine their knowledge of English with their technical knowledge needed in their future careers for a good professional conduct.

Course Outcomes   مخرجات التعليم:

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

1. The students should be able to create technical report as per the requirements and demands.
2. The students should have fluency to correspond in different situations such as job applications, cover letters, resumes, inquiry etc…
3. The students should have confidence to face job interviews, customer presentations and group discussions.
4. The students should be articulate enough in academic and professional environments.

الكتاب المقرر والمراجع المساندة:

Textbook and references

Successful Writing at Work by Philip C. Kolin, 4th ed., 2015

Summarized Course Description

Course number: ECE 210	Course name: Electric Circuits (1)
لغة تدريس المقرر : English	Pre-requisites: MATH205 & PHYS103
Credit hours: 3 (2+ 2+ 0)	Course level: Level 4 /Year2

Course Description   وصف المقرر :

Circuit elements, Basic laws: Ohm's, KVL, KCL, and Power calculations. Resistive circuits: voltage and current divider rules, Dependent sources. Circuit analysis techniques: Nodal and Mesh analysis. Network theorems: Thevenin's Norton's, Source transformation, Superposition, Maximum power transfer. Energy storage elements: definitions and voltage-current relationships. Responses of first order LR and LC circuits. Responses of second order circuits. Phasor steady-state sinusoidal circuits analysis.

Course objectives   أهداف المقرر :

1. Apply basic laws: Ohms law, KVL, KCL and power calculations.
2. Analyze resistive networks' and simplify complicated networks.
3. Use different circuit analysis techniques.
4. Deal with circuit containing energy storage elements.
5. Determine transient and steady state responses of first order circuits .
6. Perform Phasor frequency domain analysis.

<u>Course Outcomes</u>   مخرجات التعليم:

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

1. Apply knowledge of mathematics, science, and engineering to the analysis and design of electrical circuits.
2. Identify, formulate, and solve engineering problems in the area circuits and systems.
3. Design an electric system, components or process to meet desired needs within realistic constraints.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Electric Circuits	James Nilsson and Susan Riedel	Pearson	2014
Fundamentals of Electric Circuits	Charles K. Alexander, Matthew N. O. Sadiku	McGraw Hill	2016
Introductory Circuit Analysis	Robert Boylesta	Pearson	2016

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نموذج (هـ)

Summarized Course Description

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Course number: ECE 260	Course name: Digital Logic Circuit Design
لغة تدريس المقرر: English	Pre-requisites: MATH 103T
Credit hours: 4 (**3-2-0**)	Course level: Level - 5

Course Description   وصف المقرر :

Number systems & codes. Logic gates. Boolean algebra. Karnaugh maps. Analysis and synthesis of combinational systems. Decoders, multiplexers, adders and subtractors, PLA's. Types of flip-flops. Memory concept. Counters. Registers. Sequential circuit design. System level digital design. HDL (Verilog) use in the design and synthesis of digital systems. Field-programmable gate arrays (FPGAs).

Course objectives   أهداف المقرر :

1. Introduce digital principle with emphasis on logic design.

2. Familiarize the students with necessary mathematical tools such as number systems, codes, and Boolean algebra .

3. Present the principle of analysis and design of computational logic circuits.

4. Present the principle of analysis and design of sequential logic circuits.

Course Outcomes   مخرجات التعليم:

Upon completing the course, the students will be able to:

1. Understand basic terminology, types of logic gates (AND, OR, NOT, NAND, NOR, XOR)

2. Perform the basic operations used in computers and other digital systems.

3. Apply basic rules of Boolean algebra, De Morgan's laws

4. Utilize the universality of NAND and NOR gates for implementing logic functions.

5. Use Karnaugh maps for circuit minimization.

6. Analyze and design computational logic circuits.

7. Analyze and design sequential logic circuits.

8. Ability to use CAD tools to simulate and verify logic circuits.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Text Book: Digital design by M Morris Mano & Michael D. Ciletti, 5th edition (or later), Pearson; 5 edition (January 9, 2012), ISBN-13: 978-0132774208
ISBN-10: 0132774208

References:

Alan B. Marcovitz, Introduction to Logic Design, third edition, McGraw Hill, 2010
John F. Wakerly, Digital Design:Principles and Practices Package, fifth Edition, Pearson Education, 2017

Summarized Course Description

Course number: ECE 211	Course name: Electric Circuits (2)
لغة تدريس المقرر : English	Pre-requisites: ECE 210
Credit hours: 3 (2+ 2 + 0)	Course level: Level - 5 Year3

Course Description   وصف المقرر :

Three-phase circuits and power calculation, linear op-amp and op-amp circuits, transient and steady state response of the first-order and the second-order circuits, Laplace transform and solution of circuits in complex-frequency domain, frequency response of passive circuits, transfer functions, poles and zeros, resonance networks, and filters, two-Port networks, mutually-coupled coils and the ideal transformer.

Course objectives   أهداف المقرر :

- Understand and analyze AC power generation and consumption
- Design power factor correction and power matching circuits.
- Understand and analyze three phase electrical systems.
- Understand and analyze transformers.
- Identify, characterize, and design RLC Filters.
- Characterize and analyze two-port electrical networks

Course Outcomes   مخرجات التعليم:

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

1. An ability to apply knowledge of mathematics, science, and engineering to the analysis of electrical circuits.
2. An ability to apply knowledge of mathematics, science, and engineering to the design of electrical circuits
3. An ability to identify, formulates, and solves basic electrical engineering problems.
4. An ability to use the techniques, skills, and modern engineering tools such as Multisim to analysis and design electrical circuits.
5. An ability to conduct experiments, as well as to analyze and interpret data.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Electric Circuits	James Nilsson and Susan Riedel	Pearson	2014
Fundamentals of Electric Circuits	Charles K. Alexander, Matthew N. O. Sadiku	McGraw Hill	2016
Introductory Circuit Analysis	Robert Boylestad	Pearson	2016

Summarized Course Description

Course number: ECE 202	Course name: Engineering Mathematics
لغة تدريس المقرر : English	Pre-requisites: MATH221T
Credit hours: 3 (3+ 0+ 0)	Course level: Level 5 Year 3

Course Description   وصف المقرر :

Special functions. Bessel's functions and Legendre polynomials. Vector analysis including vector fields, divergence, curl, line and surface integrals, Green's, Gauss' and Stokes' theorems. Sturm-Liouville theory. Complex Numbers, Functions of a complex variable, differential complex calculus. Complex integration, Cauchy's theorem. Complex series, Taylor and Laurent series. Residue theorem. Introduction to partial differential equations and boundary value problems in rectangular, cylindrical and spherical coordinates.

Course objectives   أهداف المقرر :

To develop and enhance the student's ability to solve engineering problems using mathematical tools

Course Outcomes   مخرجات التعليم:

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

1.   Apply knowledge of a vector field and its differentiation (divergence and curl) and boundary value problem as applied to electrical systems.
2.   Explain and discuss the theorem of Green, Stokes, Divergence, Sturm-Liouville, Cauchy Integral and Residue.
3.   Clarify complex calculus and partial differential equations and their applications in Electrical Engineering field
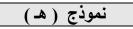4.   Interpret heat and wave equations appropriate for electrical engineering

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Advanced Modern Engineering Mathematics	Glyn James	Prentice Hall	2011
Advanced Engineering Mathematics	Erwin Kreyszig	Wiley	2011
Engineering Mathematics with Examples and Applications	Xin-She Yang	Academic Press	2017

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Summarized Course Description

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Course number: ECE 241	Course name: Electronics (1)
لغة تدريس المقرر: English	Pre-requisites: ECE 211
Credit hours: 4 (3-2-0)	Course level: Level - 6

Course Description   : وصف المقرر

Opamp Linear Applications. PN junction and zener diodes. Diode Models. Diode basic circuit analysis and diode applications (e.g. rectifier and limiters). MOSFET and BJT (Mode of operation, Terminal characteristics, DC biasing, small signal analysis). Amplifier configurations and characteristics. CMOS digital circuits.

Course objectives   : أهداف المقرر

1. Introduce the op-amps and its basic applications.
2. Present different types of diodes and its main applications.
3. Introduce different types of transistors, their modes of operations, and DC biasing techniques.
4. Apply knowledge of mathematical models to design single transistor amplifiers.
5. Be familiar with different digital families and get the required knowledge to design CMOS logic gates.

Course Outcomes   مخرجات التعليم:

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

1. Analyze and design different circuits using ideal op-amps.
2. Identify and characterize different semiconductor devices (P-N Junction, BJT, MOSFET, and JFET).
3. Understand different diode and transistor applications (clipping, clamping, amplifier, digital gates ...).
4. Analyze and design different electronic circuits contain semiconductor devices using devices' models.
5. Identify the design parameters and different characteristics of small signal amplifiers.
6. Understand different digital families and get the required knowledge to select the proper family for a certain application.
7. Use the techniques, skills, and modern engineering tools such as PSPICE to analysis and design electronic circuits.
8. Conduct electronics experiments including analysis and interpretation of measured results.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Text Book: Sedra and Smith, "Microelectronic Circuit," 7th Edition (or later), 2014, Oxford University Press, ISBN 9780199339136.
References:
Richard Jaeger, and Travis Blalock, Microelectronic Circuit Design, 5th Ed., McGraw Hill Education, 2016. SBN: 0073529605.
Mark N. Horenstein, Microelectronic Circuit and Devices (2nd Edition) (Part A & B), Pearson, 1994, ISBN 10: 0137013353 ISBN 13: 9780137013357

Brief Course Description

Course number: ECE 220	Course name: Electromagnetics
لغة تدريس المقرر: English	Pre-requisites: ECE 210, ECE 202
Credit hours: 4 (3+ 2+ 0)	Course level: Level 6- Third Year

Course Description   وصف المقرر :

Course description:
Review of vector algebra and vector Calculus. Electrostatics:
Coulomb's law, Gauss's law, electric potential, Poisson's and Laplace's equation, image method, resistance and capacitance. Magnetostatics: Biot-Savart law, Ampere's law, Magnetic forces, magnetic boundary conditions and inductance.

Course objectives   أهداف المقرر :

- ✓ To introduce the basic concepts of electric charge and magnetism.
- ✓ To explain the concepts of the electrostatic field, the potential difference, and Gauss law.
- ✓ To allow students learn the principals of the static magnetism and its laws.
- ✓ To link the electric circuits elements to electromagnetism.

Course Outcomes   مخرجات التعليم:

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

- Use vector algebra and vector calculus in electromagnetism.
- Describe and explain the basic concepts of electricity and magnetism such as charge, potential and field.
- Understand Gauss' law, Ampere's Law, Biot-Savart law and their applications.
- Carry out experiments, analyze the obtained data and compare with theoretical results.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Elements of Electromagnetics (textbook)	M. Sadiku	Oxford University Press	2015
Engineering Electromagnetics	W.H. Hayt, and J. A. Buck	McGraw-Hill	2007
Fundamentals of Applied Electromagnetics	F. T. Ulaby and U. Ravaioli	Pearson	2015

مختصر توصيف المقرر

رقم المقرر ورمزه: ECE 203	اسم المقرر: Introduction to Engineering Design
لغة تدريس المقرر: English	المتطلب السابق: MATH 103T
الساعات المعتمدة: (1-2-0)2	مستوى المقرر: Year 3-Level 6

وصف المقرر: **Module Description**

This course is a sophomore level design course that introduces the basic elements of engineering design with emphasis on teamwork and communication skills. It exposes students to engineering profession, jobs and disciplines. Topics include problem-solving procedure: from problem definition, needs identification, literature review, concept generation, generation of alternatives, selection methodology to solution implementation, and assessment of implementation. Reverse engineering and engineering code of ethics with impact of engineering solutions on society is also discussed. This course gives practice in open-ended problems, critical and lateral thinking, planning and scheduling through design project plus organization of the work and design documentation. It enables students to consider safety, legal, environmental and human factors, and other societal constraints in execution of their design projects.

أهداف المقرر: **Module Aims**

The course aims to introduce the engineering design process, the tools and the techniques used for product development or services applied to many engineering disciplines like industrial, mechanical, electrical and computer. This course provides opportunities for students to develop oral and written communication skills and work effectively in teams. It gives students opportunity to practice elements of active learning and demonstrate skills in the engineering design process in completing a design project.

مخرجات التعليم: (الفهم والمعرفة والمهارات الذهنية والعملية)

يفترض بالطالبة بعد دراستها لهذا المقرر أن تكون قادرة على:

Take personal responsibility for learning as of how to search and collect information and rearrange it for a given topic.	
Use skills in teamwork including team norms and use effective teams discussion tools such as team agenda, minutes and team process check	
Explain problem definition techniques and problem solving strategies	
Explain quality, customer expectations, and process	
Explain planning components such as Gantt chart, deployment chart and critical path	
Discuss ethical issues, safety considerations, and environmental, social and cultural impact pertaining to the project.	
Present technical work in an organized way using modern techniques such as book keeping (Design Notebook), using checklist, etc.	
Present professional behaviour in the areas of	

punctuality, time management, meeting deadlines, and professional appearance appropriate of engineering professionals	
Develop written and oral communication skills while networking with faculty and students.	

الكتاب المقرر والمراجع المساندة:

سنة النشر	اسم الناشر	اسم المؤلف	اسم الكتاب
2001	McGraw Hill	Arvid Eide , Roland Jenison Larry Northup , Lane Mashaw	**Introduction To Engineering Design and Problem Solving**
2007	Prentice Hall	Fogler, H.S., LeBlanc, S., E	**Strategies for Creative Problem Solving**
2013	Cengage	John R. Karsnitz, Stephen O'Brien , John P. Hutchinson	**Engineering Design: An Introduction**
2009	Great Lake Press	W.C. Oakes, L.L. Leone, and C.J. Gunn	**Engineering Your Future: A Comprehensive Approach**

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

List of topics	No. of Weeks
What engineering do? Engineering disciplines and their systems	1
Learning Culture	1
Introduction to Engineering Design Process and design team	2
Creative Problem Solving	2
Generation of alternative concepts, evaluation of alternatives and selection of a concept. Design defense and performance evaluation and design report	3
Engineering The Profession and Communication	2
Architecture and physical function decomposition; human factor, environment, and safety issues in design;	1
Autonomous Learner, time management and study skills	1
Engineering codes of ethics and impact of solution on society	1

Brief Course Description

Course number: ECE 270	Course name: Signals and Systems
لغة تدريس المقرر: English	Pre-requisites: ECE 210
Credit hours: 3 (3+ 0 + 0)	Course level: Level 6 - Third Year

Course Description   وصف المقرر :

Representation and properties of continuous time signals. Linear time-invariant systems and convolution. Fourier series. Fourier transform and applications. Sampling theorem. Laplace transform. Transfer functions. Time domain analysis of discrete linear systems and z-transform. The discrete Fourier transform.

Course objectives   أهداف المقرر :

- ✓ To familiarize the students with the fundamental concepts of continuous and discrete signals and systems and their properties.
- ✓ To explain the notion of linear time-invariant systems and convolution.
- ✓ To explain the different transform-domain techniques and their applications
- ✓ To acquire skills to simulate and implement basic signal analysis.

Course Outcomes   مخرجات التعليم:

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

- Understand the characterization of both continuous- and discrete-time signals and systems.
- Identify LTI systems and carry out convolution operation.
- Understand and manipulate the different transform-domain techniques and their applications.
- Simulate signals and systems using Software tools such as Matlab.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Signals, Systems and Transforms (textbook)	Charles L. Phillips, John M. Parr, Eve A. Riskin	Pearson	2014
Signals and systems	Alan V. Oppenheim, Alan S. Willsky, with. S. Hamid	Prentice-Hall	1997
Signals and Systems: Continuous and Discrete	Rodger E. Ziemer, William H Tranter, D. R. Fannin	Pearson	1998
Signals and Systems Using MATLAB	Luis F. Chaparro	Academic Press	2010

Course Description Summary

Course number: ECE 371	Course name: Communications Systems
لغة تدريس المقرر: English	Pre-requisites: ECE 270
Credit hours: 4 (3+2+0)	Course level: Seventh Level- Fourth Year

Course Description   وصف المقرر :

Review of Fourier series and Fourier transform Amplitude modulation. Phase and frequency modulation. Sampling and quantization, Pulse code modulation, Line coding and spectra, Signaling over band-limited channels and inter-symbol interference, Digital modulation schemes. Introduction to current and emerging communication systems

Course objectives   أهداف المقرر :

- ✓ To introduce basic communication systems and their signal flow diagrams.

- ✓ To enable describing AM and FM modulation schemes in both time and frequency domains and design basic AM and FM systems.

- ✓ To enable grasping the analog-to-digital conversion and line coding.

- ✓ To introduce digital modulation schemes and their applications.

Course Outcomes   مخرجات التعليم:

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

- Derive and describe the frequency spectrum of different types of radio signals.
- Identify, analyze, compare, and implement amplitude and frequency modulation schemes.
- Understand sampling and analog to digital conversion.
- Identify and implement basic digital modulation schemes.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Modern Digital and Analog Communication Systems (textbook)	Lathi B. P.	Oxford University Press	2018 5th Edition
Digital and Analog Communication Systems	Couch L. W.	Prentice-Hall	2013
Communication Systems Engineering	Proakis J. G. and Salehi M.	Prentice-Hall	2002
Digital Communications: Fundamentals and Applications	Sklar B.	Prentice-Hall	2009

Summarized Course Description

Course number: ECE 330	Course name: Control Systems
لغة تدريس المقرر: English	Pre-requisites: ECE 270
Credit hours: 3 (3+ 0 + 0)	Course level: Level 7 - Fourth Year

Course Description   وصف المقرر :

Introduction to control systems. Representation of physical control system elements. Transfer functions, Signal flow graphs. State space analysis. Sensitivity, static accuracy and transient response. Stability of control systems : Routh criterion, Root locus, Frequency response methods, Nyquist stability criterion. Compensation techniques. Introduction to digital control and the Z transform. Discrete time control system.

Course objectives   أهداف المقرر :

Students will be able to:
 • Develop mathematical models for linear dynamic systems in continuous and discrete time
 • Use time domain and frequency domain tools to analyze and predict the behavior of linear systems.
 • Use time domain and frequency domain techniques to design feedback compensators to achieve a specified performance criterion.
 • Use MATLAB for system analysis and design.

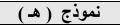## Course Outcomes   مخرجات التعليم:

On successful completion of this course, the students will have developed

- knowledge and understanding of
    - i) essence of using feedback and structure of feedback systems
    - ii) basic principles of control system analysis in the time-domain
    - iii) basic principles of control system analysis in the frequency-domain
- their skills in:
    - i) evaluating transient and steady-state responses of control systems
    - ii) designing basic controllers
- their appreciation of and respect for values and attitudes regarding the issues of:
    - i) feedback

    - ii) reliability and economy in control system design

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Modern Control Systems, 13th edition.	Richard C. Dorf and Robert H. Bishop	Pearson	2017
Automatic Control Systems, 9th edition	FARID GOLNARAGHI, BENJAMIN C. KUO	JOHN WILEY & SONS, INC.	2010
Feedback Control of Dynamic Systems 8th Edition	Gene F. Franklin J. David Powell, Abbas Emami-Naeini	Pearson	2019

Summarized Course Description

Course number: ECE 331	Course name: Energy System
English : لغة تدريس المقرر	Pre-requisites: ECE 211
Credit hours: 3 (3+ 0 + 0)	Course level: Level 7 - Year 4

Course Description   وصف المقرر :

conventional and renewable energy sources and their environmental consequences; overview of power systems structure-generation, transmission, and distribution- and its changing landscape; review of phasors and three-phase electric circuits; fundamental principles in magnetic theory; principle and structure of transformers; principles of electromechanical energy conversion; theory and operation of induction machines; synchronous generators and motors; theory and operation of dc motor.

Course objectives   أهداف المقرر :

- understand basic concepts of electrical machines and transmission lines
- will learn how to start and operate an electrical machine;
- learn the details of construction of different types of electrical machines;
- learn how to analyze the performance and design the components
- learn how to perform experimentation with electrical machines

Course Outcomes   مخرجات التعليم:

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

1. Understand of the power systems and its changing landscape.
2. Know the sources of energy and the environmental consequences.
3. review the fundamental principals in magnetic theory that are essential in learning about power system apparatus.
4. Learn about transformers and the role they play in power systems.
5. Learn about AC machines and the role they play in power systems.
6. Understand the principles and application of DC motors.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Principles of Electric Machines and Power Electronics	P.C. Sen,	John Wiley	2016
Electric Machines & drives	Ned Mohan	John Wiley	2012
Fundamentals of Electric Machinery	Chapman	McGraw Hill	2012

Brief Course Description

Course number: ECE 304	Course name: Probability and Random Processes
لغة تدريس المقرر: English	Pre-requisites: MATH 265
Credit hours: 3 (3+0+0)	Course level: Seventh Level-Fourth Year

Course Description   وصف المقرر :

Review of basics of probability, moment generating and characteristic function, bivariate RVs, joint and marginal distributions, multiple RVs, transformations of multiple RVs, general discrete- and continuous random processes, stationarity and ergodicity, Gaussian and Poisson random processes, auto- and cross-correlation functions, power spectral densities, and linear systems with random inputs.

Course objectives   أهداف المقرر :

- ✓ To familiarize the students with the algebra of random variables.
- ✓ To explain the characterization of random processes in both time and frequency domains.
- ✓ To highlight the applications of multiple random variables and random processes in communication systems.

Course Outcomes   مخرجات التعليم:

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

- Understand the notion of the moment generating and characteristic function and their relevance.
- Derive the distribution function, moments, and transformations of multiple RVs.
- Understand the notions of a random process, stationarity and ergodicity.
- Carry out the basic temporal and spectral characterization of stationary random processes.
- Simulate bi-variate RVs and random processes using the related software tools.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
"Probability, Random Variables, and Random Signal Principles" (textbook)	P. Z. Peebles and B. Shi.	McGraw-Hill, New 4th Edition	2015
"Probability and Random Processes for EE"	Leon-Garcia, A.	Addison Wesley, 2nd Edition	1994
"A First Course in Probability"	Ross, S.	Prentice Hall, 5th Edition	1998
"Probability and Stochastic Processes for Engineers"	Helstrom, C. W.	Addison-Wesley, 2nd Edition	1992
Probability and Random Processes With Applications to Signal Processing and Communications.	Miller, S.	Academic Press, 2nd Edition	2012

Brief Course Description

Course number: ECE 380	Course name: Communication Networks
لغة تدريس المقرر : English	Pre-requisites: ECE 371, ECE304
Credit hours: 4 (3+ 2 + 0)	Course level: Eighth Level - Fourth Year

Course Description   وصف المقرر :

Review of basic digital communications and probability theory. Network architectures. OSI Model and TCP/IP model. Physical layer protocols and digital transmission fundamentals. Data link layer protocols. Network layer protocols. Medium access control protocols. Packet switching and circuit switching. Routing techniques in packet switching networks. Security protocols. Emerging high-speed networks.

Course objectives   أهداف المقرر :

✓ To describe the current layered architecture and its purposes.
✓ To explain data link/MAC layer functions and describe the current standards and applications.
✓ To explain network and transport layer functions and describe routing algorithms and TCP/IP protocols.
✓ To highlight security measures in Telecommunication networks.

Course Outcomes   مخرجات التعليم:

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

- Understand the architecture of communication networks and layered network model.
- Identify and describe the OSI model layers and their protocols.
- Understand and differentiate packet switching and circuit switching.
- Identify the routing strategies and their link to network topology.
- Apply course knowledge to implement networking principles.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Communication Networks: Fundamental Concepts and Key Architectures (textbook)	Alberto Leon-Garcia, Indra Widjaja	McGraw-Hill	2004
Data and Computer Communications (can be a textbook)	Stallings, W.	Prentice Hall	2013
Computer networking: a top-down approach	James Kurose, Keith Ross.	Pearson	2009
Data Communication and Networking	Behrouz .A, Forouzan	McGraw-Hill	2013
Computer Networks	Tanenbaum A. and Wetherell D. J.	Prentice Hall	2010

Brief Course Description

Course number: ECE 372	Course name: Digital Communications Systems
لغة تدريس المقرر : English	Pre-requisites: ECE 371, ECE304
Credit hours: 3 (3+ 0 + 0)	Course level: Eighth Level - Fourth Year

Course Description   وصف المقرر :

Review of basic digital modulation and random processes. Baseband transmission of digital signals. Matched filter. Band-pass transmission of digital signals. Optimum Receivers and BER Analysis over AWGN channels. Introduction to information theory. coding: Block codes and convolutional codes. Channel

Course objectives   أهداف المقرر :

✓ To familiarize the students with baseband digital communication schemes.
✓ To enable modeling and analyzing the performance of AWGN channels.
✓ To introduce the basics of source and channel coding
✓ To investigate the applications of modern digital comm. schemes.

Course Outcomes   مخرجات التعليم:

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

• Understand and describe baseband transmission principles and pulse shaping.
• Derive the optimum receiver design over AWGN channels.
• Analyze the performance of digital modulation schemes over AWGN channels.
• Understand the basics of entropy, channel capacity, and source coding.
• Identify and implement basic channel coding schemes.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Communication Systems (textbook)	S. Haykin and M. Moher	John Wiley & Sons	2010
Modern Digital and Analog Communication Systems	Lathi B. P.	Oxford University Press	2018, New 5th Edition
Digital and Analog Communication Systems	Couch L. W.	Prentice-Hall	2013
Communication Systems Engineering	Proakis J. G. and Salehi M.	Prentice-Hall	2002
Probability And Random Processes for Electrical Engineering	Alberto Leon-Garcia	Pearson	2008

Brief Course Description

Course number: ECE 374	Course name: Digital Signal Processing
لغة تدريس المقرر: English	Pre-requisites: ECE 270
Credit hours: 3 (3+ 0 + 0)	Course level: Level 8-Year 4

Course Description   وصف المقرر :

Review of signals and systems. Discrete-time systems classification. Linear shift-invariant system response, difference equations, convolution, and frequency response. Discrete Fourier transform. z-transform and its application to system analysis. Realization forms. Sampling and aliasing. Finite-impulse response (FIR). Design windowing technique. Introduction to infinite impulse response (IIR). Filter design techniques.

Course objectives   أهداف المقرر :

✓ To enable the use of the z-transform and its properties to analyze LTI discrete-time systems.
✓ To explain the Discrete Fourier Transform and its computation using the Fast Fourier Transform.
✓ To explain sampling in frequency domain and analog to digital and digital to analog conversion.
✓ To acquire the analytical tools and software skills to analyze and design digital filters.

Course Outcomes   مخرجات التعليم:

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

• Understand and analyze discrete-time signals and systems in the z-transform-domain.
• Grasp the Discrete Fourier Transform; its properties; and its efficient computation using the FFT algorithms.
• Assimilate sampling theorem, and analog to digital and digital to analog conversion.
• Design and analyze digital filters to meet certain frequency domain specifications.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Digital Signal Processing: Principles, Algorithms and Applications	J. G. Proakis and D. G. Manolakis	Prentice Hall	2007
Discrete-Time Signal Processing	A. V. Oppenheim and W. Schafer	Pearson Education	2011
Digital-Time Signal Processing- A Computer-based Approach	S. K. Mitra	McGraw-Hill	2011
Digital Signal Processing in Communications Systems	Marvin E. Frerking	Springer	1994

Brief Course Description

Course number: ECE 373	Course name: Wireless Communications
لغة تدريس المقرر: English	Pre-requisites: ECE 371, ECE304
Credit hours: 3 (3+ 0 + 0)	Course level: Eighth Level -Fourth Year

Course Description   وصف المقرر :

Review of basics of communications systems. Introduction to wireless communications, Channel modeling and propagation. The cellular concept. Modulation schemes for wireless systems. Fading mitigation techniques. Spread spectrum and OFDM. Multiple access schemes, Wireless standards.

Course objectives   أهداف المقرر :

- ✓ To introduce wireless communication systems and their relevance in today's life.
- ✓ To allow the students model and parametrize wireless fading channels.
- ✓ To explain the signal design for wireless systems and networks
- ✓ To familiarize the students with wireless standards and their specifications.
- ✓ To acquire skills to carry out technical search.

Course Outcomes   مخرجات التعليم:

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

- Understand the basic concepts of wireless systems.
- Identify and describe the main propagation characteristics in wireless channels.
- Analyze the performance of modulation schemes over fading channels and implement them using Software tools.
- Identify and compare the fading mitigation techniques and their performance over wireless channels.
- Conduct technical search in wireless communications area.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Wireless Communications: principles and practice" (textbook)	T.S. Rappaport	Prentice Hall	2002
Journal and Magazine Papers (as reading handouts)	-------------------	------------------	------------------
Principles of Mobile Communication	G.L. Stuber	Kluwer Academic	2001
Wireless Communications	Andreas F. Molisch	Wiley-IEEE Press	2010
Mobile Wireless Communications	M. Schwartz	Cambridge University Press	2005
Mobile Wireless Communications	Mischa Schwartz	Cambridge University Press	2005
Wireless Communications	Andrea Goldsmith	Cambridge University Press	2005
Fundamentals of wireless communication	D. Tse and P. Viswana	Cambridge University Press	2005

Summarized Course Description

Course number: ECE 390	Course name: Summer Training
لغة تدريس المقرر : English	Pre-requisites: The student must pass at least 125 credits
Credit hours: 1	Course level:

Course Description   : وصف المقرر

A continuous period of 8 weeks of summer training spent in the industry working in any of the fields of electrical engineering. The training should be carried out in an organization with an interest in one or more of these fields. On completion of the program, the student is required to submit a formal written report of his work.

Course objectives   : أهداف المقرر

- Enable the students to link theory and practice and to gain valuable practical/field experience.
- Provide guidance for future career opportunities.
- Familiarize the students with the work environment after graduation.
- Develop the student's work ethics.
- Develop the student's communication skills.
- Develop the ME student's teamwork skills.
- Enhance the relationship between the Electrical Engineering Department and industry.

Course Outcomes   :مخرجات التعليم

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

1. Understand the company organization, services, products and goals.
2. Understand the role of their departments and the contribution of their groups to the company's operation.
3. Identify, formulate, and solve engineering problems.
4. Practice the use of technology tools in designing and implementing electrical systems on practice.
5. Deliver and present their work experience and any projects effectively through written and oral communication.
6. Recognize the importance of self learning and development.
7. Follow work regulations.

Textbook and references   :الكتاب المقرر والمراجع المساندة

Book	Authors	Publisher	Publication year

Brief Course Description

Course number: ECE 475	Course name: - Advanced Communications Lab
لغة تدريس المقرر: English	Pre-requisites: ECE 372, ECE 373
Credit hours: 2 (1+ 2+ 0)	Course level: Level 9- Fifth Year

Course Description   وصف المقرر :

This lab is mainly intended to strengthen the students' experience with digital and wireless communication systems. It provides practical hands-on experience with communication system building blocks and enables students to study the effects of noise and fading on the various digital communication schemes and wireless standards. The course instructor may design/select the proper set of experiments that satisfy the course objectives and outcomes.

Course objectives   أهداف المقرر :

- ✓ To provides the students with practical hands-on experience with the digital communication system building blocks and their functions.
- ✓ To enable both simulation and implementation of the various digital modulation schemes.
- ✓ To study the effects of fading and its mitigations techniques.
- ✓ To explore the design and the practical limitations of communications systems and standards.

Course Outcomes   مخرجات التعليم:

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

- Acquire hands-on experience with the digital communication systems
- Carry out both off-line simulations (using Matlab,..) and real-time implementation (using National Instruments, Keysight,.. platforms) of the various digital communication schemes
- Understand the effects of both AWGN and fading on the performance of these schemes.
- Understand the implementation constraints of the digital communication systems.
- Explore the basics of network planning and implement using related software tools.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year

Simulation of Communication Systems: Modeling, Methodology and Techniques	Michel C. Jeruchim Philip Balaban K. Sam Shanmugan	KLUWER ACADEMIC PUBLISHERS	2000
Principles of Communication Systems Simulation with Wireless Applications	William H. Tranter K. Sam Shanmugan Theodore S. Rappaport Kurt L. Kosbar	PRENTICE HALL	2004
Digital Communication Systems Using MATLAB and Simulink	Dennis Silage	Bookstand Publishing	2016
Problem-Based Learning in Communication Systems Using MATLAB and Simulink	Kwonhue Choi Huaping Liu	Wiley-IEEE Press	2016
LabVIEW Digital Signal Processing: and Digital Communications	Cory Clark	McGraw Hill	2005

Brief Course Description

Course number: ECE 421	Course name: Antenna Theory and Design
لغة تدريس المقرر : English	Pre-requisites: ECE 220
Credit hours: 4 (3+ 2 + 0)	Course level: Elective-Fifth Year

Course Description   وصف المقرر :

Review of Maxwell's equations and antenna basics. Radiation patterns and Friis equation. Radiation integrals. Linear wire antennas. Antenna arrays. Synthesis of far field patterns by array factors. Broadband antennas and matching techniques. Microstrip antennas. Introduction to antennas in wireless systems. Methods of antenna measurements. Antenna design using commercial software.

Course objectives   أهداف المقرر :

- ✓ To introduce the fundamentals of antenna theory and the standard antenna parameters.
- ✓ To explain simple antennas such as dipole, monopole, loop, traveling-wave antennas as well as microstrip antennas, and antenna arrays.
- ✓ To explain the self and mutual impedance of linear elements and arrays.
- ✓ Acquire the analytical and software skills for antenna design and analysis.

Course Outcomes   مخرجات التعليم:

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

- Understand of antenna fundamentals and far field radiation.
- Design different types of antenna arrays with required radiation pattern and performance in communication systems.
- Understand self and mutual impedance and the basics of numerical analysis for antennas.
- Carry out antenna design and analysis using standard simulation software.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Antenna Theory: Analysis and Design (textbook)	Constantine A. Balanis	John Wiley	2016
Antenna Theory and Design	Warren L. Stutzman, and Gary A. Thiele	John Wiley	2012
Antenna Theory and Design	R. S. Elliott	Prentice Hall	2003

Brief Course Description

Course number: ECE 477	Course name: Introduction to Information Theory and Coding
لغة تدريس المقرر: English	Pre-requisites: ECE 304, ECE 371
Credit hours: 3 (3+ 0 + 0)	Course level: Elective-Fifth year

Course Description   وصف المقرر :

Review of probability theory. Entropy, Mutual information. Data compression. Huffman coding. Universal source coding. Channel capacity. Block codes and hard-decision decoding. Convolutional codes and soft-decision decoding.

Course objectives   أهداف المقرر :

- ✓ To familiarize the students with the notions of entropy, compression, mutual information, and channel capacity.
- ✓ To explain the different data compression schemes and their applications.
- ✓ To explain the basic channel coding schemes and their applications.
- ✓ To acquire the skills to simulate common source coding and channels coding schemes.

Course Outcomes   مخرجات التعليم:

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

- Derive and calculate the entropy and mutual information for basic source and channel models.
- Understand the principles of source coding and apply compression techniques to practical situations.
- Grasp the notion of channel capacity and its derivation for AWGN channels.
- Understand the encoding and decoding of the different channel coding techniques; and their use in current communication systems.
- Design and implement linear block codes or convolutional codes to meet certain requirements.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Book	Authors	Publisher	Publication year
Applied Coding and Information Theory for Engineers	R. Wells	Prentice Hall	1999
Coding and Information Theory	R. W. Hamming	Prentice Hall	1986
Modern Digital and Analog Communication Systems	Lathi B. P.	Oxford University Press	2018, New 5th Edition
Error Control Coding: Fundamentals and Applications	S. Lin and D. J. Costello	Prentice Hall	2004

Course Description Summary

Course number: ECE 476	Course name: Optical Communications
لغة تدريس المقرر : English	Pre-requisites: ECE 371, ECE 220
Credit hours: 4 (3+2+0)	Course level: Elective

Course Description   وصف المقرر :

The course covers underlying and fundamental light characteristics concepts and   demonstrates components, types, and communication of fiber optics which support modern wireless communication systems and networks. Some of the basic knowledge of some networks (SONET/SDH) has been described in this course. The focus for optical networking fundamentals is on the physical layer of the network protocol stack. The optical line terminal and optical line amplifier of WDM networks is studied in this course.

Course Outcome   مخرجات التعليم:

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

1. describing light as an electromagnetic wave
2. describing the polarization of light wave
3. explain the interference effects on light wave
4. Explain the basic elements of optical fiber transmission link
5. Explain the fiber modes
6. Stating the basic operating principles of single mode and multimode fibers.
7. Describe the different Transmission constraints
8. Compare between different types of propagation
9. Stating the difference between the couplers, isolators and circulators
10. Explain the principle of operation of multiplexers and filters
11. Stating the advantages and disadvantages of optical amplifiers
12. Compare between the different types of optical amplifiers
13. Explain the different components of digital communication optical system
14. Explain the transmitters and detectors, switches, wavelength converters.
15. Explain the switches and wavelength converters.
16. Describing the interaction between optical components and IP
17. Explain light path routing solution,
18. Explain the OSPF enhancements
19. Stating the different types of IP links
20. Discriminate between the control channels, data channels,
21. Explain the integrated optical networks
22. Recalling the modulation
23. Explain the subcarrier modulation and multiplexing
24. Stating spectral efficiency
25. Explain the spectral efficiency

26. Explain the error detection and correction.
27. Explain the time division multiplexing,
28. Differentiate between the VCAT and LCAS,
29. Describe the SONET/SDH layers,
30. Explain the SONET frame structure,
31. Explain the SONET/SDH physical layer,
32. Discriminate the elements of a SONET/SDH infrastructure
33. Explain the optical line terminal.
34. Distinguish between the different types of optical line amplifiers.
35. Explain the Add/Drop multiplexers
36. Explain the cross-connects.

المواضيع
Topics

- Light Characteristics: light as an electromagnetic wave, polarization, interference
- Fiber Optics: Modes, Transmission constraints (fiber-optic cable modes, fiber optic glass, plastic optical-fiber, fluid-filled fiber optics, transmitting light on a fiber, light propagation in multimode fiber, single mode propagation)
- Fiber Optics Components: couplers, isolators and circulators, multiplexers and filters, optical amplifiers, transmitters, detectors, switches, wavelength converters.
- Optical networking fundamentals: interaction between optical components and IP, light path routing solution, OSPF enhancements/ IS-IS, IP links, control channels, data channels, integrated optical networks
- Fiber Optics Communications: modulation, subcarrier modulation and multiplexing, spectral efficiency, demodulation, error detection and correction.
- SONET/SDH Networks: multiplexing, VCAT and LCAS, SONET/SDH layers, SONET frame structure, SONET/SDH physical layer, elements of a SONET/SDH infrastructure
- WDM Networks: optical line terminal, optical line amplifiers, Add/Drop multiplexers, cross-connects.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Textbook:

- Rajiv Ramaswani ,Kumar N. Sivarajan, Galen H. Sasaki, "Optical Networks. A practical perspective" , Morgan Kauffman publishers, 3rd Edition.
References:
- Optical Fiber Communication, Gerd Keiser, Mc-Graw Hill, Last edition.John R. Vacca, " Optical Networking. Best practices Handbook" , John Wiley & Sons publisher, 2007

Course Description Summary

Course number: ECE 478	Course name: Satellite Communications Systems
لغة تدريس المقرر : English	Pre-requisites: ECE 371, ECE 220
Credit hours: 3 (3+0+0)	Course level: Elective

Course Description   وصف المقرر :

The course is intending to cover the fundamental concepts of satellite communications and orbital concepts. The student is expected to understand the basics of satellite communications, satellite system elements, key issues of satellite, handle error control for digital satellites, and grasp the propagation effects on satellite-earth links.

Course Outcome   مخرجات التعليم:

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

1. Describing satellite orbit
2. Explain Kepler's three lows
3. Compute orbital Period
4. Classify different orbital elements
5. Recognizing coordination elevation and azimuth angles
6. Describing orbital size, shape, orientation, and satellite location
7. Compare the role of different subsatellite systems
8. Compare between different transponders
9. Solve problems on antenna gain and diameters
10. Design link budget for satellite uplink/downlink
11. Differentiate between different frequency bands used by satellite
12. Differentiate between satellites in different altitudes
13. Recalling basic transmission theory
14. Classify different propagation effects (gases, rain, ionosphere, scintillations(
15. Compare between rain types
16. Compute rain attenuation
17. Recognize contour maps for rain rate
18. Explain digital transmission
19. Describe QPSK modulation technique
20. Recognize different multiple access techniques
21. Stating errors occurred and solutions
22. Classify different satellite applications

المواضيع
Topics

- Introduction to satellite - communications and its applications
- Satellite systems elements
- Satellite signal coding
- Satellite link design
- Orbits and launching methods
- Beam angle and directivity
- Altitude control
- Frequency distribution

- Radiation Pattern
- Error control for digital satellite
- Modulation and Multiplexing techniques
- Multiple access
- Propagation effects and their impact on satellite-earth link
- Exploration of some applications of satellite systems (GPS, Mobile
- communication, WEB communications)

Textbook and references   الكتاب المقرر والمراجع المساندة:

"Timothy Pratt, Charles W. Bostian, Jeremy E. Allnutt, "Satellite Communication Systems", John Wiley & Sons, The Latest Edition

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نموذج (هـ)

Course Description Summary

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Course number: ECE 481	Course name: Wireless Sensor Networks
لغة تدريس المقرر : English	Pre-requisites: ECE 304, ECE 371
Credit hours: 3 (3+0+0)	Course level: Elective

Course Description   وصف المقرر :

This course provides an overview of basic networking concepts, including network architecture, design, the layering concept in networking and how data transferring between devices.

Course Outcome   مخرجات التعليم:

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

1. Recognize sensors platforms.
2. State the features of wireless sensor networks (WSN).
3. Describe wireless technologies for WSN
4. Explain the different applications of WSN
5. State different types of WSN.
6. State the current challenges for WSN.
7. State the research trends for WSN.
8. Describe Layers of the WSN Protocol stack.
9. Interpret CSMA technique
10. Describe MAC protocol
11. Describe SMAC protocol
12. Describe TRAMA protocol
13. Recognize routing mechanisms for Wireless sensor networks
14. Differentiate between Flat, Hierarchical, and geographic routing protocols.
15. Differentiate between flooding and gossiping protocols.
16. Describe SPIN routing protocol.
17. Describe Leach routing protocol.
18. Describe Pegasis routing protocol.
19. Explain Geographic routing.
20. Differentiate between Greedy and Face routing.
21. Describe GPRS routing protocol.
22. State the features of operating systems for WSN
23. Describe the components of tinyOs
24. Describe the interfaces of tinyOs, configurations, and wiring.
25. Describe the configurations of tinyOs.
26. Describe the wiring of tinyOs.
27. State challenges for time synchronization in WSN
28. Describe Global Positioning System
29. Describe NTP protocol
30. Describe TPSN protocol

31. State the general characteristics of IEEE 802.15.4 standard.
32. Describe the supported topologies of IEEE 802.15.4 standard.
33. Describe the physical layer of IEEE 802.15.4 standard.
34. Describe MAC layer of IEEE 802.15.4 standard.
35. State the challenges for localization algorithms in WSN.
36. Differentiate between range-based, range free localization techniques.
37. Describe Time of arrival (TOA) ranging technique
38. Describe one way TOA technique
39. Describe two way TOA technique
40. Describe Received Signal Strength RSS technique.

المواضيع
Topics

-Introduction to the course content, text book(s), reference(s) and course plan.
-Sensor networks: sensor platforms, WSN architecture and protocol stack, applications (military, environmental, health, home, industrial), factors influencing WSN design (hardware constraints, fault tolerance, scalability, power consumption, topology, transmission media)
-MAC protocols: challenges for MAC, CSMA, SMAC, and TRAMA.
-Network layer: challenges for routing, data centric and flat architecture protocols (flooding, gossiping, SPIN), hierarchical (Leach, Pegasis), geographic routing, energy efficient routing protocols.
-Location and positioning in wireless sensor networks: greedy and face routing protocols.
-TinyOs concepts and programming: components, interfaces, configurations, and wiring.
-Time synchronization in wireless sensor networks: challenges for time synchronization, Network Time Protocol, Timing Sync Protocol for WSN.
-IEEE 802.15.4 standard: general characteristics, supported topologies, physical, and Mac layers overview.
-Localization: challenges, ranging techniques, range based localization techniques, range free localization techniques.

الكتاب المقرر والمراجع المساندة: Textbook and references

-Ian F.kyildiz, and M.Can Vuran , Wireless sensor networks, 2010.
-C. Poellabauer , Fundamentals of wireless sensor networks. Theory and practice, 2010Wiley.

Summarized Course Description

Course number: ECE 491	Course name: Electrical Engineering Seminar
لغة تدريس المقرر : English	Pre-requisites: The student must pass at least 125 credits
Credit hours: 1 (0+ 0 + 2)	Course level: Level 9 - Fifth Year

Course Description وصف المقرر :

This course provides a forum for students to discuss and generate ideas on issues related to their field of study. Students conduct an in-depth study of a research topic of their choice, discuss issues with experts in the field of research, work in discussion groups, debate and problem solve on selected issues. In the seminar, the students are given an opportunity to integrate their knowledge, skills and practical experience gained in the program.

Course objectives أهداف المقرر :

This course seeks to:

1. Provide students with the opportunity to improve critical thinking skills by writing and orally defending a persuasive research paper in which arguments counter to the stated position are addressed.
2. Provide students with the opportunity to improve oral communication skills by giving two formal oral presentations.
3. Provide students with the opportunity to develop skills in writing to a general audience as opposed to writing to a specific audience as typically occurs in courses for the major.
4. Provide students with the opportunity to strengthen information literacy skills in order to be able to recognize when information is needed and to locate, evaluate, and use effectively the needed information.
5. Provide students with an opportunity to view their own disciplines, their intended careers, and their lives in the larger contexts of life-long learning.
6. Bring together students and faculty members from diverse academic fields to reflect on their college careers, to integrate what they have learned with the experiences of others.

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

Book	Authors	Publisher	Publication year

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

Course Description	وصف المقرر:
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.	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.

الموضوعات التي سيتم تناولها: Topics to be covered

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

أهداف المقرر:

Course Aims	
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.	تتلخص أهداف هذا المقرر في 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.

مخرجات التعليم: (الفهم والمعرفة والمهارات الذهنية والعملية)

يفترض بالطالبة بعد دراستها لهذا المقرر أن تكون قادرة على:

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

الكتاب المقرر والمراجع المساندة:

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

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

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:

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

Textbook and references

<div dir="rtl">الكتاب المقرر والمراجع المساندة:</div>

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

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

Module Description
وصف المقرر:

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

Module Aims
أهداف المقرر:

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

Topics to be covered
الموضوعات التي سيتم تناولها:

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	

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نموذج (هـ)

Summarized Course Description

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Course number: ECE 492- 493	Course name: Capstone Design Course Sequence
لغة تدريس المقرر : English	Pre-requisites: GEN 202, Senior Standing
Credit hours: 2 (**1+2+0**) (each)	Course level: Level 9 & 10

Course Description   وصف المقرر :

A two-semester course sequence that integrates various components of the curriculum in a comprehensive engineering design experience. Design of a complete project including establishment of objectives and criteria, formulation of design problem statements, preparation of engineering designs. The design may involve experimentation, realization and/or computer project. Team design projects, where appropriate, are highly encouraged.

Course objectives   أهداف المقرر :

An integral part of the education provided to undergraduates in engineering is a senior two-semester course sequence in "capstone" design. The objectives of the sequence are to:

1. Require application of the knowledge gained in earlier courses to the design process.
2. Familiarize the student with the engineering design process: Definition, Synthesis, Analysis and Implementation.
3. Improve communication skills.
4. Promote organizational skills.
5. Stress importance of other influences on design such as economics, reliability, performance, safety, ethics and social impacts.
6. Simulate the postgraduate job environment.

Course Outcomes   مخرجات التعليم:

    After completing the courses students will able to:

1. Design a system or process to meet specifications with engineering constraints.

2. Function as a member of an engineering team.

3. Utilize technical resources both from prior coursework, as well as from other relevant sources.

4. Demonstrate excellent written and oral communication skills related to design project results.

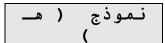5. Demonstrate an understanding of ethical and professional issues as well

as engineering standards related to their projects.

6. Demonstrate an understanding of contemporary issues as related to their projects.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Text Book: R. M. Ford and C. S. Coulston, Design for Electrical and Computer Engineers - Theory, Concepts and Practice, New York: McGraw-Hill, 2008 (Recommended Reference)
ISBN-10: 0132774208
References:

H.F. Hoffman, The Engineering Capstone Course: Fundamentals for Students and Instructors, DOI 10.1007/978-3-319-05897-9_2, © Springer International Publishing Switzerland 2014

Summarized Course Description

Course number: ECE 201	Course name: Programming Applications For Engineers
لغة تدريس المقرر : English	Pre-requisites: CS 110T
Credit hours: 3 (2+ 2+ 0)	Course level:　Level - 5

Course Description　　　　　　　　　　　وصف المقرر :

Fundamental principles, concepts and methods of programming (C and MATLAB), with emphasis on applications in the physical sciences and engineering. Basic problem solving and programming techniques; use of programming logic in solving engineering problems.

Course objectives　　　　　　　　　　　أهداف المقرر :

1. Give students an introduction to the uses of computer languages in the analysis of contemporary scientific problems covering the basic syntax and structure with examples drawn from real applications.

2. Covers both conceptual areas of converting a problem to be solved into a computer-based solution, and specific aspects of individual languages and the types of problems they are best suited to solve.

3. Emphasis is placed on the importance of structure, documentation, major toolboxes and libraries, interfacing techniques and platform specific issues.

Course Outcomes　　　　　　　　　　　مخرجات التعليم:

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

1. Demonstrate competency in the fundamental principles, concepts and methods of programming (C and MATLAB), with emphasis on developing solutions in the domains of physical sciences, mathematics, and engineering.

2. Demonstrate the ability to function as part of a technical team to generate the solution to a programming problem.

3. Explore common programming concepts in various computing environments and implement those concepts across more than one language.

4. Analyze alternative algorithm designs to implement a solution designed to make efficient use of limited resources of the computer.

Textbook and references   الكتاب المقرر والمراجع المساندة:

Text Book:

Forouzan and Gilberg, Computer Science, A Structured Programming Approach Using C, 3rd ed.

References:

1. Problem Solving and Program Design in C, 8th edition, Jeri Hanly and Elliot Koffman, Prentice Hall, 2016.

2. The C Programming Language. 2nd ed. Kernighan, Brian, and Dennis Ritchie. Upper Saddle River, NJ: Prentice Hall, 1988. ISBN: 9780131103627.

3. Matlab, Fourth Edition: A Practical Introduction to Programming and Problem Solving, 4th Edition , Stormy Attaway, Todd Green, ISBN-13: 978-0128045251 ISBN-10: 0128045256.