Sohar University
Faculty of Engineering
Electrical and Computer Engineering
Courses Description- Courses offered in the academic year 2016-2017

	Course Code & Name	Description
Level 1: Semester 1	**MATH1000:** Mathematical Foundations	This course covers basic mathematics that will be necessary in any degree or career that involves quantitative skills. The course covers many aspects of analysing functional relationships. Graph sketching is useful in picking trends and modelling economic or physical systems. The course will cover limits and continuity of functions. Carrying on from this, the calculus of derivatives and integrals will be introduced. Any system, which varies with time, requires knowledge of derivatives. Also, the theory of integration is important for differential equations.
	COMP1500: Introduction to Programming	This course will enable you to solve engineering problems, develop computer algorithms, acquire working knowledge of C++ programming and experience some "hands-on" computer lab activities.
	ENGG1013: Engineering Drawing and Computer Drafting	This course will introduce the standards, conventions, techniques and tools of technical graphics so that the students will be able to convey graphically the ideas and information necessary for the construction or analysis of machines, structures and systems. In addition Computer Aided Drafting is also covered and practiced using AutoCAD.
	CHEM1020: General Chemistry	General Chemistry deals with the Properties of gases, solids, & solutions, phase changes, Thermochemistry, Equilibria with applications to acid – base chemistry & to solubility of salts, Electrochemistry and kinetics. This course will introduce the students the fundamental concepts about various states of matter. It will enhance their knowledge on mass and energy conversion .In general terms the course is aimed to make the student understand the basic principles of chemistry.
	UNIR1000: Communication Skills	This course is designed to provide students with those skills required to communicate effectively and efficiently at their future work place and increase their career prospects. Being directed towards the work environment, the course intends not just to familiarize students with the functional language they will need to employ in their future jobs, but also to build up their confidence in communicating in English and increase their fluency. Also the course will enlarge students' knowledge of the business world.

	Course Code & Name	Description
Level 1: Semester 2	**ENGG1023:** Engineering Materials	This introductory course involves the development of the following concepts: Types of Materials- Metals, ceramics, and polymeric materials. Bonding between atoms-The characteristics of atoms, atomic structure, bonding and inter-atomic forces. Describe quantitatively and qualitatively the structure of SC, FCC, BCC and HCP crystals. The microstructure and Properties– the way in which large groups of atoms are arranged in a solid on the microscopic scale – governs many of the properties of a material; Processing-Structure-Properties-Performance. Determine the mechanical properties of a material from its stress-strain diagram. Determine steady state and transient diffusion profiles. Determine the equilibrium phase structures in binary alloys. Describe techniques to prevent corrosion in metal.
	ENGG1010: Applied Mechanics	Mechanics refers to the branch of science that studies the way in which forces affect bodies either at rest or in motion. Engineers are concerned with the way that mechanics can be applied so that they can determine how objects will react to forces that are applied to them. This allows the engineer to ensure that an object under a given load will serve its intended purpose. Thus the title of this course, Applied Mechanics. Engineering students learn how to analyze and predict the behaviour of physical systems in this course. This course comprises two major sections - Statics and Dynamics. Statics is the study of objects in a state of force equilibrium and dynamics is the study of objects in motion. While this course leads to skills that an engineer can directly apply to basic analysis and design, applied mechanics also forms the basis for more advanced courses taken by students during their studies. These range from structural analysis, advanced dynamics, fluid and particle mechanics through to engineering acoustics.

	Course Code & Name	Description
	ELEC1100: Principles of Electrical Circuits	The course provides the necessary skills in the analysis and design of electrical and electronic circuit and components which are fundamental to the study of electrical systems, electronics, computer systems and communications systems. The course covers the fundamental parameters of electrical system such as voltage, current, power, energy, resistance, capacitance, and inductance. DC circuit analysis theorems such as Ohms law, Kirchhoff's laws, node analysis, Mesh analysis, Thevenin's theorem, Norton's theorem are covered. The concept of AC circuit including sinusoidal waveform interpretation and the basic RLC circuit analysis also covered.
	MATH1100: Calculus & Linear Algebra	The course provides an exposition of appropriate results in the study of basic differential equations, basic linear algebra, and vector calculus with emphasis on methods and techniques that have proved relevant in a wide variety of applications. Students should gain knowledge of various mathematical tools and be able to apply these tools to problems from various sources.
	UNIR1001: Oman & Islamic Culture	The course provides introduction to Islamic Culture, its importance, resources and characteristics, Islamic culture and contemporary events, Omanis role in spreading Islam and building Islamic civilisation.

	Course Code & Name	Description
Level 2: Semester 1	**ELEC2200:** Electrical and Electronic Circuit Analysis	The purpose of this unit is to introduce AC circuit and their applications in electrical engineering; physical models of semiconductor devices; and common electronic circuits using discrete semiconductor devices.
	COMP2101: Introduction to Digital Systems	The course provides introductory knowledge and skill in digital system design. The students will understand operation and electrical and timing properties of basic digital building blocks. They will also understand a hardware description language for specification and simulation of digital circuits. The students will be able to analysis and design simple digital systems. Through practical the students will implement small systems with standard digital circuits.
	ELEC2113: Instrumentation & Measurement	This course introduces the fundamentals of measurement, meters, sensors, instrumentation, calibration, virtual instrumentation and data analysis. It provides the students with an integrative and multidisciplinary experience. It also allows the student to design and develop instrumentation, data acquisition and data analysis software using modern equipment and software tools.
	MATH2100: Calculus & Statistics	This course deals with statistics and probability for engineers. The following topics are covered: data representation, mean, median, range, mode and standard deviation. Probability topics include experiments, outcomes, events, permutations and combinations, Random variables, probability distributions, median and standard deviation as well as the normal, binomial, and hyper-geometric distributions. The second part involves series, arithmetic series and geometric series and their applications. The third part covers the application of Laplace Transforms to solve differential equations and systems of differential equations with constant coefficients. In particular, the following are to be introduced in this part: Laplace transform definition, Inverse Laplace Transform, linearity, shifting, Transforms of derivatives and integrals, differential equations, Unit step function, second shifting theorem, Dirac's Delta function, Differentiation and integration of transforms, Convolution and integral equations. In the final part of the course, the three main types of linear partial differential equations (PDEs) are introduced in the context of applications to vibrations of a stretched string, steady and unsteady diffusion. Fourier's method of separation variables and superposition is presented in this context, including an introduction to Fourier Series.

	Course Code & Name	Description
Level 2: Semester 2	**ELEC2013:** Signals & Systems	The course provides an introduction to the theory and practice of signals and systems and to the many branches of engineering and mathematics that stem from it. It focuses on one-dimensional signals and single-input, single-output, linear time-invariant systems and their applications in linear circuit analysis and synthesis, filter design, signal processing, telecommunications and control.
	ELEC2300: Electrical Energy Conversion & Utilization	This course will provide an overview of the processes and devices involved in the generation, transmission and utilisation of electrical energy. It also provides students with the fundamentals of magnetic circuits and transformers which will be useful for other courses in the curriculum.
	COMP2113: Fundamentals of Computer Systems	The course provides the basic computer system, the main components of the computer system, Arithmetic logic unit, storage elements, RAM, Types of RAM, ROM, Types of ROM, input/output system, Instruction cycle, fundamentals of the microprocessors and introduction to the operating systems.
	UNIR2000: Organisational Communications	The purpose of the course is to equip students with the necessary skills/tools that are required in communicating within an organisation. It focuses on understanding the various types of communication that organisations use and ways in which to make and create effective communication.
	UNIR1002: Arabic Language Skills	It involves simple definition about Arabic language branches and skills (speaking, reading, writing) in addition to the fundamental rules that help mastering these skills.

	Course Code & Name	Description
Level 3: Semester 1	**ELEC3100:** Fundamentals of EM Fields & Waves	This course establishes the fundamentals of distributed transmission media, transmission line types and their characteristic impedance, wave propagation on a transmission line and impedance matching. The course also introduces basic electromagnetic theory as required by students in telecommunications, computing and other engineering based technologies.
	ELEC3400: Electronic Circuits	The course covers the following topics: Small signal analysis of BJT and FET, Frequency response of the amplifiers, Constant current sources, Differential amplifier, Multistage amplifier, Power amplifiers, Feedback amplifiers, Operational amplifier and its applications (linear and non-linear applications), Active filters, Oscillators and multivibrators circuits.
	ELEC3000: Control Systems Engineering	Introduction to control system design; system modelling principles for electrical & mechanical systems; the Laplace transform; block diagram modelling; open & closed loop control; role of feedback; transient & steady state performance; root locus; frequency response analysis; compensator design, practical issues in the implementation of control systems.
	ENGG3700: Numerical Analysis	This introductory course in numerical analysis provides the Knowledge and methods required to solve numerically, practical mathematical problems frequently encountered in engineering applications. This course include Mathematical modelling & error analysis, programming with MATLAB, root finding, solving of linear algebraic equations, curve fitting, performing numerical integration and differentiation and solving ordinary differential equations.

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	Course Code & Name	Description
Level 3: Semester 2	**ELEC3500:** Power Electronics	The application of semiconductor devices in the electric power field has been steadily increasing. This course will describe how to design, specify and apply power semiconductor converters. The student will be able to analyse converter characteristics in order to understand how these converters interact in various applications.
	COMS3100: Introduction to Communication Systems	This course introduces the basic principles and methods of modern communication systems. It aims to develop a basic understanding of the theories and principles of analog communication systems. Students are expected to be able to understand and analyse simple communication systems. This course also aims to provide students with the background knowledge of antenna, radio communication and occurrence of noise to further their study in electronic communications.
	COMP3300: Microprocessors & Microcontrollers	The course provides good understanding of the microprocessors and microcontrollers systems. The first part of this course covers the microprocessor which includes the architecture and assembly language programming, Pentium processor will be used as example of advance and modern microprocessor. The second part of this course will focus on the microcontrollers and their applications. ATmega16 microcontroller will be covered in details as an example of advance and modern microcontrollers. The course covers the architecture, internal structure, programming and applications of the microcontroller systems.
	UNIR3000: Research Methodology	The purpose of the course is to equip students with the necessary writing and language skills required to undertake an independent research project. It focuses on developing academic writing skills and understanding the various steps in the research process. This will include an introduction to the research process, reviewing and analysing sources, incorporating sources, and applying correct academic format.

	Course Code & Name	Description
Level 4: Semester 1	**ENGG4801A:** Thesis Project	Project management in high-tech electrical & information technology engineering laboratories, where dealing with risk & fast changing technologies are special factors. Good working knowledge of project management for the early career engineer. Development of interpersonal skills for team management
	COMP4200: Computer Systems Architecture	This course introduces the fundamental aspects of computer architecture such as performance measures for computer, instruction set design, computer arithmetic, data path design, controller design, memory hierarchy, cache, virtual memory, interfacing processors & peripherals and parallel processors
	ELEC4400: Advanced Electronics & Power Electronics Design	This course will provide the theory and practice of power electronics and other related advanced electronic circuits. The course is about using electronics to process or control power. This can be from many Megawatt in an electric train, to less than one Watt in a mobile phone. There is now usually some power electronics in most electrical or electronic equipment. The principles learnt in this course can be applied to many other areas too.
	ELEC4600: Signal & Image Processing	This course covers the theory and practice of processing analogue signals on a digital computer. The course covers the complete spectrum of modern digital signal processing (DSP) techniques from signal acquisition; digital representations of time and spatial domain signals; signal processing; and digital signal conversion to analogue. The theory covered in this course is essential for the complete engineering understanding of many modern multimedia devices such as mobile phones, mp3 players, digital cameras, digital image and video storage and transmission.

	Course Code & Name	Description
Level 4: Semester 2	**ENGG4801B:** Thesis Project	Project management in high-tech electrical & information technology engineering laboratories, where dealing with risk & fast changing technologies are special factors. Good working knowledge of project management for the early career engineer. Development of interpersonal skills for team management.
	COMS4100: Advanced Digital Communication Theory &Systems	This course aims to develop the fundamental knowledge of communications theories and their applications in digital communications. The course covers the structure of the digital communication systems, pulse modulation technique, digital modulation techniques, probability of error in digital communication system, multiple access techniques, channels and source coding, mobile and satellite communication systems.
	ELEC4300: Power Systems Analysis	Modern power systems have grown larger with many interconnections between neighbouring systems. Proper planning, operation and control of such large systems require advanced computer based techniques. This course will provide a solid foundation in classical methods and modern techniques in power systems engineering for senior level electrical engineering students. ELEC4300 course content includes the concepts of power system for various normal and abnormal conditions. The course will train students with modern computer-based techniques for solving a wide range of power system problems.
	ENGG4000: Renewable & Sustainable Energy	Energy and Sustainable Development, Non-Renewable Energy , Renewable Energy, Solar Energy, Photovoltaic, Wind Energy, OTEC Energy, Biomass Energy, Geothermal Energy, Fuel Cells, Hydrogen Economy, Energy Systems, Combustion Systems, Climate Change & Energy, Life Cycle Analysis, Atmospheric Pollution, Energy Sustainability Metrics, Energy Optimization, Energetics / Exergetics, Sustainability and Business, Energy Storage.