EERE2201	Introduction to Renewable Energy		3 Credit Hours
Prerequisites	**Physics II and Chemistry**	**Co - Requisites**	
Goal	To understand the importance of renewable energy resources and its utilization for the thermal and electrical energy needs and also the environmental aspects of these resources.		

Objectives	Outcomes
The course should enable the students to : 1. Understand the various forms of conventional energy resources. 2. Learn the present energy scenario and the need for energy conservation 3. Explain the concept of various forms of renewable energy 4. Outline division aspects and utilization of renewable energy sources for both domestics and industrial application 5. Analyse the environmental aspects of renewable energy resources.	Upon completion of the course, the student will be able to: 1. Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations. 2. Know the need of renewable energy resources, historical and latest developments. 3. Describe the use of solar energy and the various components used in the energy production with respect to applications like - heating, cooling, desalination, power generation, drying, cooking etc. 4. Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications. 5. Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications 6. Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations. 7. Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.

MATH 2100	Calculus II	3 Credit Hours
Prerequisites:	MATH 1200	
Goal	To provide the students with further calculus to extend the applications	

Objectives

The course should enable the student to:

1. Grasp the various techniques of integration
2. Perceive the partial derivatives in dealing with functions of two and three variables
3. Conceive multiple integration
4. Realize the mathematical model to formulate the governing differential equation of a problem and predict the solution under different sets of conditions

Outcomes

The students should be able to:

1. Apply various techniques of integration
2. Employ definite integrals to find area between two curves, volume, arc length, work, power and energy
3. Deal with indeterminate forms and improper integrals
4. Recognize integrals with infinite limits of integration
5. Carry out partial derivatives
6. Find total differential and approximations
7. Treat integration by partial fractions
8. Deal with functions of several variables and carry out multiple integrals
9. Deal with infinite series and test for convergence and divergence
10. Operate with conic sections and polar coordinate system with applications
11. Differentiate and integrate power series
12. Be familiar with numerical approximations of integrals
13. Formulate the differential equation by using mathematical model approach to represent a realistic situation and find the solutions which predict the behavior under various boundary conditions

EEPW 2150	Electrical Principles	3 Credit Hours
Prerequisites:	PHYS 1210	
Goal	To provide students with an understanding of basic electrical principles and concepts, leading to the ability to carry out calculations involving DC circuits, inductive circuits, capacitive circuits and AC fundamentals.	

Objectives

This course should enable the student to:

1. Understand DC circuit theorems.
2. Select a suitable replacement inductor for a specific application
3. Select a suitable replacement capacitor for a specific application
4. Examine simple RL and RC circuits and determine time constants and magnitudes of instantaneous voltage and current
5. Determine the basic terms used to define periodic AC voltage and AC current waveforms.
6. Analyze series and parallel AC circuits containing resistance (R), inductance (L) and capacitance (C) connected to a steady-state sinusoidal voltage source.
7. Correctly use a dual trace CRO to determine AC voltage and current, period, phase angle, frequency and DC voltage.
8. Explain the operating principles of the ideal transformers.

Outcomes

A student who satisfactory complete the course should be able to:

1. Apply DC circuit theorems to solve engineering problems.
2. Distinguish between different types of commercially available inductors.
3. Identify inductor characteristics using manufacturers' data sheets.
4. List typical applications for inductors in electric circuits.
5. Determine by measurement whether a given inductor is serviceable and state common faults.
6. Describe the precautions to be taken when opening highly inductive circuits.
7. Define capacitance and explain how a capacitor is charged and discharged in terms of its electrostatic field.
8. Calculate the capacitance of a capacitor given voltage and charge.
9. List the factors which determine the capacitance of a capacitor.
10. Distinguish between different types of commercially available capacitors.
11. Identify capacitor characteristics using manufacturers' data sheets.
12. List typical applications for capacitors in electric circuits.
13. Calculate and measure the equivalent capacitance of series and parallel connected capacitors.
14. Determine through measurement whether a given capacitor is serviceable and state common faults.
15. State the hazards and precautions to be observed when working with large capacitors.
16. Construct simple circuits incorporating RL and RC networks for a given time constant .

17. Determine the time constant for RL and RC circuits .
18. Determine the instantaneous voltage and current values in RL and RC circuits for multiples of time constant.
19. Describe periodic AC voltage and current waveforms in the time domain.
20. Explain how a sinusoidal output voltage is generated in a single turn coil rotating in a uniform magnetic field and sketch the sine wave.
21. Discuss the various types and characteristics of AC generators used to produce sine, square, rectangular and triangular AC waveforms.
22. Measure the instantaneous, peak, peak-peak values and period of sinusoidal waveform.
23. Calculate the Root Means Square (RMS) value and frequency of a sinusoidal waveform using measured values of peak voltage and period.
24. Determine the phase relationship between two or more sinusoidal waveforms given a waveform diagram or from measurements.
25. Define inductive reactance, capacitive reactance and impedance, and indicate how each varies with frequency.
26. Draw phasor diagrams to show the phase relationship between voltage and current in a pure resistor, pure capacitor and pure inductor respectively.
27. Calculate and measure the voltages and currents in series and parallel RL, RC and RLC circuits.
28. Draw the impedance triangle and phasor diagrams for series and parallel RL, RC and RLC circuits.
29. Define true, reactive and apparent power and power factor.
30. Describe the function of each block given the block diagram of a CRO.
31. Identify and describe the functions of each control on the faceplate of the CRO.
32. Calibrate the CRO in order to make accurate measurements.
33. Connect the CRO in circuit and measure period AC voltages, DC voltages.
34. Derive AC circuit current and signal frequency by calculation from CRO measurements.
35. Describe the calibration and measurement limitations of CRO probes.

	36. Describe the basic operation and construction of a transformer mentioning the need for a sine wave input. 37. Define transformer turns ratio. 38. List typical applications of power transformers. 39. Define volt-amp rating. 40. Calculate and measure primary and secondary voltages and currents in step-up and step-down transformer circuits.

ACT
English Language Center
Course Outline
Technical Communication (ENGL 2100)
Credit Hours 3
Lecture Hours 3

1. Course Description

At the end of this course, the students will have learned to write on technical subjects for the practical needs of a special audience. They will also have learned to process information, objectively and persuasively, making use of information and communication technologies.

2. General Aims

- Develop clear and accurate written and oral presentation of business,
- technical and scientific information.
- Promote critical thinking, continuous self- assessment and peer review.
- Encourage independent research skills.
- Prepare students for their professional environment.

3. Learning Outcomes

At the end of the course, students should be able to:

- Analyze, synthesize, evaluate and interpret information and ideas.
- Write in a style appropriate to the technical purpose and audience.
- Identify and write various kinds of business and technical documents.
- Plan and manage writing projects in terms of drafting, designing, revising and editing documents.
- Write collaboratively, providing peers with constructive feedback on their work.
- Develop effective style and tone, following businesses and technical writing guidelines.
- Analyze charts, graphs, specifications, diagrams, etc. and respond orally and in writing.
- Design visually effective documents (e.g. layouts, formatting, incorporating graphics and visuals into documents)
- Prepare and deliver an effective mixed media presentation.

4. Resources

a. McMurry, D.A. (2002). ***Power Tools for Technical Communication,*** Harcourt College Publishers.

Web sites

www.-unix.oit.umass.edu/~pwtc/tw/lonks.html
http://techpubs.com/resources.html
http://garnet.indstate.edu/kliener/eng305t/lessons/04httml
http://www.prenhall.com/pfiefer
http://www.english.vt.edu/~toomy/researcy.html

5. Content Outline

- Written communication in a variety of formats (reports, business letters, memos, employment letters, resumes)
- Technical text such as definition, description, comparison, classification, instructions and cause and effect

- Making oral presentations.

6. Learning Activities

- Discussion: one-to-one, group
- Listen and take notes
- Speak to an audience
- Write formal reports, letters etc.
- Read and respond orally and in writing.

7. Assessment Outline

♠ Quizzes	5%
♠ Mid-semester Exam	20%
♠ Assignment (Report and Presentation) (Report 20% and Presentation 5%)	25%
♠ Final Exam	50%
TOTAL	**100%**

Final grades will be based on the following scale:

Letter Grade	Percentage Range	Grade Point
A	90-100	4.0
A-	85-89	3.7
B+	80-84	3.3
B	76-79	3.0
B-	73-75	2.7
C+	70-72	2.3
C Major Requirement	67-69	2.0
C- Major Elective	60-66	1.7
D	55-59	1.0
F	54 and below	0.0

8. Assessment Specifications

8.1 Quiz (5%)

There will be 1 quiz per semester. The quiz should be answered on the standard paper provided on a topic provided by the tutor. The approximate length of the quiz shall be 250 words, and written in 30 minutes of class time. Printed or electronic dictionaries can be used to minimize spelling mistakes.

8.2 Mid-semester Exam (20%)

Time: 1 hour

Content: One writing task of 300 words covering any topic covered up to the MSE. Refer to the delivery plan.

8.3 Final Exam (50%)

Time: 2 hours

Content: Q 1. A guided task based on an item that was taught during the course.

Q 2. Free writing. The nature of the task determines the length.

8.4 Assignment (25%)

Assignment shall be research-based and can be done by individual students or by a group. The outcome shall be a written report and an oral presentation.

The assignment should include the following:

1. *Secondary Research:* Literature review using books and the internet to discuss the research topic. The literature review should include student' own words, direct quotes, and paraphrasing of the information s/he has searched.

Written Report (20%)

- The report must consist of:
  - Title page (Cover page)
  - Introduction, Body, Conclusion, and Recommendation
  - References & Appendixes
- The Body of the report should be approximately 500 words. The Introduction, Conclusion and Recommendations sections are additional.
- An outline of the report is due 2 weeks after the topic is issued.
- The first draft is due 2 weeks after that.
- The final draft is due before their presentation.
- The reference list should include at least three sources.
- The report must be word-processed, double-spaced on *A4* paper with one inch margins and *size 12 Times New Roman or* Arial font.

Grade Criteria:

A) Report	**(20%)**
B) Oral Presentation	**(5%)**

See also the appendix on marking criteria

9. Course Policies

Attendance: Attendance and active participation in class activities are required. Irregular attendance will be dealt with according to item 75 in section 8 of the "College Bylaws for Technical Colleges" (Ministerial Order No. 72/2004). Students must have an official sick leave

from a government hospital or written, signed permission from the HoD/HoC. Three incidences of lateness (exceeding 5 minutes) will be considered one absence.

Late Assignment: For late submission of assignments, students need a legitimate reason and they need to inform the instructor in advance of the reason. Otherwise, assignments will be marked down by 5% (e.g. 80% will be 75%).

Plagiarism and Cheating: Plagiarism is the presentation of another person's work, words, or ideas as if they were one's own. It ranges from an entire assignment which is not the student's own work to specific passages within an assignment which are not the student's own work but taken from a source without acknowledgement. Students are responsible for ensuring that they understand and follow the principles of proper documentation and scholarship.

Cheating is usually understood as copying from another student. However, it also includes a student or a group of students, using or attempting to use unauthorized aids, assistance, material, or methods in assignment, reports, presentations and/or examinations. If an instructor determines that the student has cheated and /or plagiarized, the college will take punitive action and a grade of zero will be assigned for the affected assignment, report, presentation, or examination.

EETE 2102	Electronics I		3 Credit Hours
Prerequisites	**PHYS 1210**	**Co-requisites**	**EEPW 2150**
Goal	To provide students with an understanding of the basic electronic devices and circuits.		

Objectives	Outcomes
The course should enable the student to: 1. Understand the basic concepts of electronics and fundamentals of electronic devices. 2. Recognize the PN junction and understand the characteristics and applications PN diodes. 3. Know the structure, types and characteristics of Bipolar Junction Transistors (BJT). 4. Understand the use of BJT in small signal amplifier circuits. 5. Know the structure, types and characteristics of Junction Field Effect Transistors (JFET) and Metal-Oxide Semiconductor Field Effect Transistors (MOSFET). 6. Understand the use of JFET and MOSFET in different electronic applications.	A student who completes this course should be able to: 1. Recognize and understand the basic concepts of semiconductor materials & how to be used in active electronic devices. 2. Describe and analyze the diode circuits. 3. Design and test different diode circuits, for example- rectifying, clipping, clamping, logic circuits etc. 4. Describe, analyze & test a basic dipolar transistor circuit. 5. Design test and repair small signal amplifier circuit using BJT. 6. Describe, analyze & investigate a basic JFET and MOSFET transistor circuits. 7. Design and test MOSFET circuits as a small signal amplifier and digital switches.

PHIL2108	Business Ethics	3 Credit Hours
Prerequisites:	None	
Goal	To equip the student with the highest ethical standards that will guide him/her through real life dilemmas.	

Objectives	Outcomes
The course should enable the student to: 1. Understand the concept of value 2. Understand Islamic and Omani values 3. Understand, appreciate and respect ethnic and cultural diversity 4. Gain the highest work ethics	The students should be able to: 1. Define the concept of values 2. Define how values develop 3. Understand the effects of religion and society on values 4. Understand the effects of Islamic and Omani values on work ethics 5. Define the concept of ethnic and cultural diversity 6. Understand the importance of ethnic and cultural diversity for society and the world 7. Work with people from different ethnicities/cultures 8. Function in a moral and ethical manner in his/her life

EEPW 2251	Electrical Power Technology	3 Credit Hours
Prerequisites:	EEPW 2150	
Goal	To provide the student with the basic concepts, techniques and applications of electrical power technologies.	

Objectives

This course should enable the student to:

1. Understand the concepts of three-phase system.
2. Understand the principle of operation of a transformer
3. Understand the principle of operation of DC machines.
4. Understand the principle of operation of three-phase induction motor.

Outcomes

A student who satisfactory complete the course should be able to:

1. Describe single-phase and three-phase supplies.
2. Compare star and delta connections.
3. Draw complete phasor diagram for both balanced star-connected load and balanced delta-connected load.
4. Calculate power in three-phase system.
5. Appreciate the advantages of three – phase systems.
6. Describe the principle of operation of a transformer.
7. Construct a transformer no-load phasor diagram and calculate magnetizing and core loss components of the no-load currents.
8. State the emf equation of the transformer.
9. Construct a transformer no-load phasor diagram for an inductive circuit assuming the volt drop in the winding is negligible.
10. Derive the equivalent resistance, reactance and impedance referred to the primary of transformer.
11. Describe the voltage regulation, losses in transformer and calculate its efficiency.
12. Describe different types of transformers like auto transformer, isolating transformer, three phase transformer, voltage transformer and current transformer.
13. Distinguish between the function of a motor and generator.
14. Describe the construction of DC machines
15. Describe commutator and armature reaction in DC machines.
16. Distinguish between wave and lap winding.
17. Describe types of generators and their characteristic and state their

	applications. 18. List DC machines losses and calculate the efficiency. 19. Calculate generated emf for generators and back emf for motors. 20. Calculate the torque for DC motors. 21. Describe types of motors and their characteristic and state their applications. 22. Describe DC motor starter and the methods of speed control of DC motors. 23. List types of enclosure of DC motors 24. Describe the operation of three-phase induction motor. 25. State the synchronous speed and calculate the slip in three-phase induction motor. 26. Distinguish between squirrel cage and wound rotor types of motor. 27. Explain how a torque is produced causing rotor movement. 28. Derive an expression for rotor emf, frequency, resistance, reactance, impedance, current and copper losses, and use them in calculations. 29. State the losses in induction motor and calculate the efficiency. 30. Drive the torque equation for an induction motor. 31. Describe torque-speed and torque-slip for an induction motor. 32. State and describe the methods of starting induction motors. 33. State typical applications of three-phase induction motors.

EECP 2270	Digital Electronics	3 Credit Hours
Prerequisites:	EETE 2102	
Goal	To provide students with an understanding of the different digital electronic circuits used in Digital Systems.	

Objectives	Outcomes
The course should enable the student to: 1. Understand and analyze switching circuits and devices. 2. Understand the basic operational parameters and characteristics of digital devices. 3. Know the different digital IC new and old families. 4. Understand the operation and applications of Schmitt trigger and multivibrator circuits. 5. Know the conversion circuits used as the interface between analog and digital systems.	A student who satisfactorily completes the course should be able to: 1. Analyze switching circuits, RC circuits and the exponential form of the signal. 2. Describe the operation of switching devices, diode circuits & bipolar and MOSFET as a switch circuit. 3. Describe the input/output voltage and current characteristics of digital devices and the important operational parameters and characteristics of digital devices like fan-out, propagation delay, switching frequency, noise margin, power dissipation and speed-power product. Basic digital terminology including the transfer characteristics, fan out, power dissipation propagation, delay times and noise margins. 4. Describe the differences between logic families RTL, DTL, TTL, CMOS, NMOS, PMOS, ECL and I^2L. 5. Analyze the operation of Schmitt trigger, monostable, astable and bistable multivibrator circuits. 6. Describe the applications 555 IC timer in digital system. 7. Analyze and describe different conversion circuits including A/D and D/A.

EEPW 2241	Electrical Skills	3 Credit Hours
Prerequisites:	EEPW 1240	
Goal	To provide the student with the concepts, techniques and application of electrical workshop.	

Objectives

This course should enable the student to:

1. Know the safety practices in the workshop and production areas.
2. Understand the aspects of electrical installation techniques.
3. Understand how to assemble steel conduit.
4. Understand how to wire lighting and circuits.
5. Understand the concepts of construction of DC and single-phase AC motors.
6. Know different methods of protections.
7. Understand how to control circuits of single phase AC motors.

Outcomes

A student who satisfactory complete the course should be able to:

1. Familiarize and apply the electricity safety rules in Oman and in IEE regulation.
2. Describe the power distribution systems, earthing arrangement, electrical bonding, PME supplies and current protective conductors.
3. Prepare for assembling steel conduit.
4. Wire lighting and power circuits.
5. Assemble and connect fluorescent and sodium vapour lamps.
6. Test the wiring circuits like visual inspection test, continuity test and insulation resistance test.
7. Define the fault diagnosis techniques in electrical insulations.
8. Describe the construction of DC and single phase AC motor.
9. Construct bell indictor circuits.
10. Apply different methods of circuit's protection.
11. Control the circuits of single-phase AC motors.

EEPW 2252	Electrical Power Systems	3 Credit Hours
Prerequisites:	EEPW 2150	
Goal	To provide the basic concepts and the overall functioning of the complete Electrical Power Systems which includes Generation, Transmission, Distribution and the importance of switchgear and Protection	

Objectives	Outcomes
The course should enable the student to study and understand 1. the overall functioning of the complete Electrical Power Systems 2. types of power generation 3. methods of transmission and distribution, 4. types of insulators 5. the importance of circuit breakers and protection methods, 6. Economics of operation of Power Systems.	The students should be able to deal with : 1 The main parts of Power Systems through Single Line Diagram of the Power Supply Systems starting from the Power Station to the L.T. consumer's Distribution Board including transmission and distribution transformers etc. 2 Basic ideas related to Functioning of different important types of Conventional and Non-Conventional Power generating stations through block diagrams. 3 Fundamental of Transmission of Electrical Power, Under ground HT and LT Power Cables, Over Head line conductors, Efficiency of transmission line, the line drop, types of transmission circuits 4 Electrical design of O/H lines : Mechanical Design of over head lines : Sag calculation, 5 Calculations Resistance, Inductance and Capacitance of transmission lines. 6 O/H lines Insulators: types of insulators- pin type, disc type (grading calculations), strain insulators and shackle insulators and post insulators. 7. Corona : power losses due to Corona in Transmission lines. 8. Voltage regulation in Power systems :Important methods of voltage regulations in power systems 9. Different bus-bar systems, Generating stations and substation earthing,

	10. Circuit Breakers : Arc Phenomena, fundamentals of MCB, MCCB, ACB, OCB, SF6, Air-blast CB, ELCB, Standard ratings, Applications details of CB, Service connections to the consumers from the Feeder pillar and from the LT poles. 11. Electrical Power Distribution Systems: Fundamentals of DC distribution and AC distribution 12. Economics aspects of Power Systems. Load Factor, Diversity Factor, Tariff Systems, methods of Power Factor improvement 13. Fundamentals of Power Carrier communications 14. Basics ideas of AC DC power Transmission

EEPW 2399	**Diploma Project**	**3 Credit Hours**
Prerequisites:	**EEPW 2251**	
Goal	To expose each student to the situation where he/she works individually or on a team in a project in the field of electrical power engineering	

Objectives	Outcomes
The course should enable the student to: 1. Integrate the various areas of knowledge he/she gained through the program 2. Consolidate personal confidence in working independently or an a team and improve his/her spirit of performance	The students should be able to: 1. Apply the knowledge he/she gained through the program into an integrated project 2. Demonstrate communication effectiveness through oral presentations and written reports 3. Present the results of work in a seminar and submit a properly written and edited final report 4. Manage his/her time to achieve a time-constrained target 5. Solve engineering problems

Introduction

This project is carried out by the student in the summer term of the Diploma program. This may be

A. One which is based on practical work

B. One, which is mostly theory based, such as design, case study, computer programming, etc.

C. A combination of A and B

MIEE 2210	Engineering Instrumentation & Industrial Control	3 Credit Hours
Prerequisites:	PHYS 1200 , PHYS 1210, and MIEE 2110	
Goal	To provide the student with full coverage of the principles and applications of instrumentation and industrial control	

Objectives

This course will prepare students who are able to:

1. Understand the operation principles and characteristics of functional elements in engineering measurement systems.
2. Perceive the principle of operation of control systems, open & closed, loop control system.
3. Know how to maintain and test engineering measurement system.

Outcomes

The students should be able to:

1. Define the functional elements of a typical measurement system.
2. Identify various types of sensors and transducers.
3. Be acquainted with all common analogue and digital devices for data presentation
4. Distinguish between open and closed loop control systems.
5. Define basic element of a control system.
6. Be familiar with system control strategies and techniques used in engineering.
7. Deal with all types of signal processing and conditioning
8. Employ different control methods, which are suitable for different types of systems.
9. Deal with operational amplifier controllers and programmable logic controllers.
10. Determine the transfer function of open and closed loop control system
11. Perform laboratory experiments on instrumentation with open and closed loop control systems.
12. Maintain and test engineering measurements systems.
13. Evaluate the performance of a given control system.