2/3 التسهيلات المادية الداعمة:

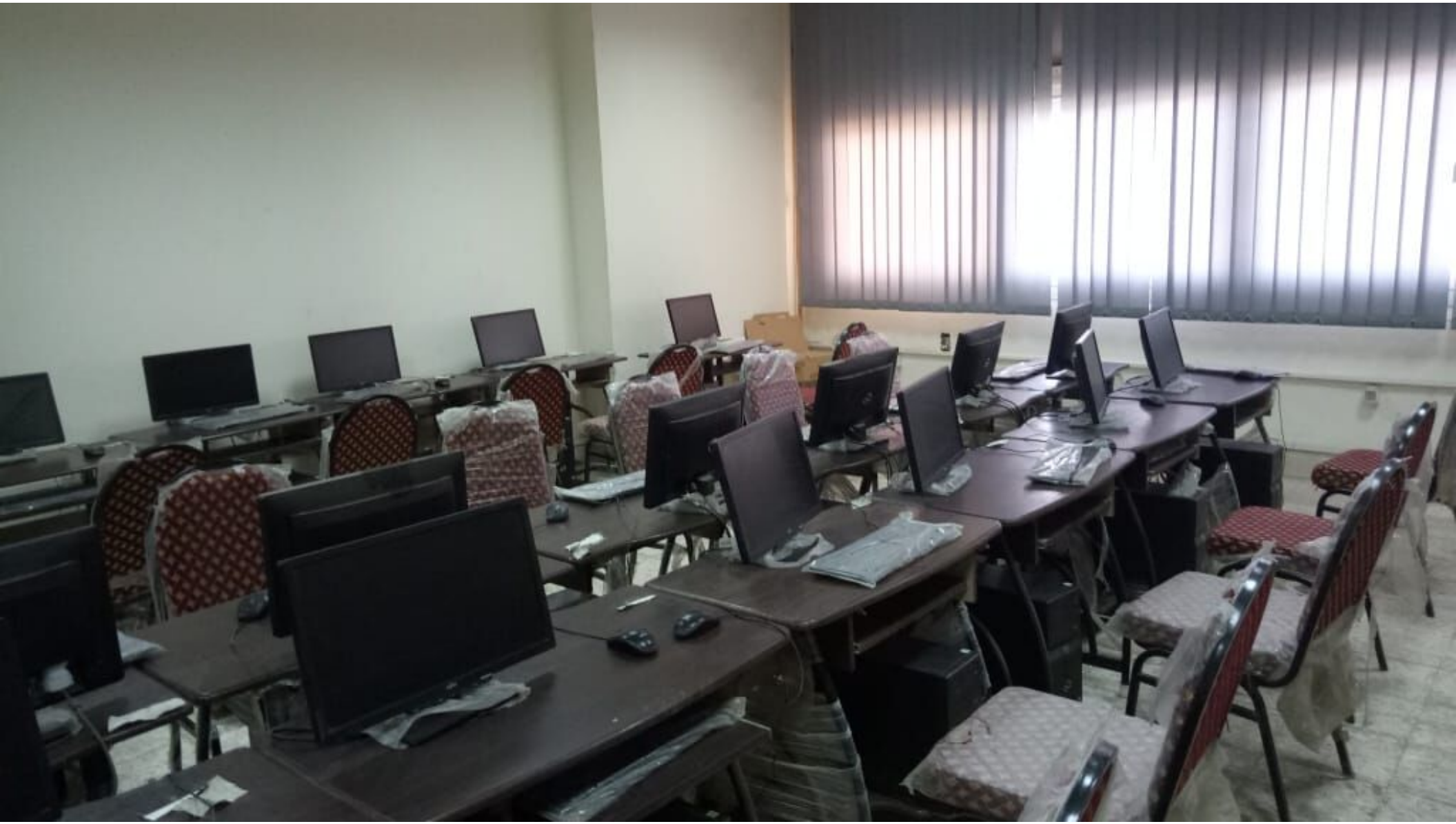
2/2/3 المعامل والتسهيلات الفنية الداعمة

مرفق 3-2-2-1 المعامل الخاصة بالبرنامج

2/3 التسهيلات المادية الداعمة:

2/2/3 المعامل والتسهيلات الفنية الداعمة

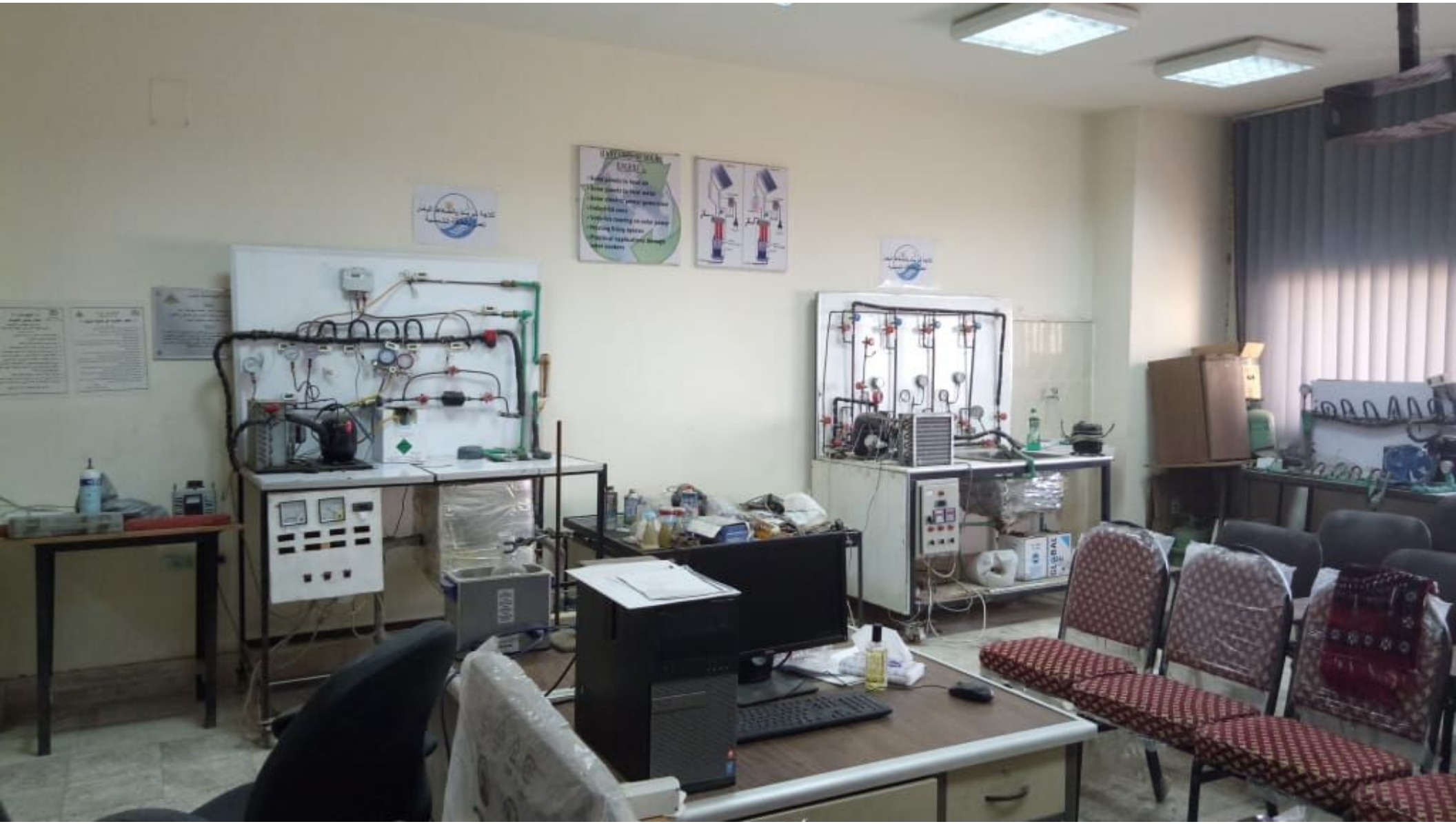
معمل الحاسب

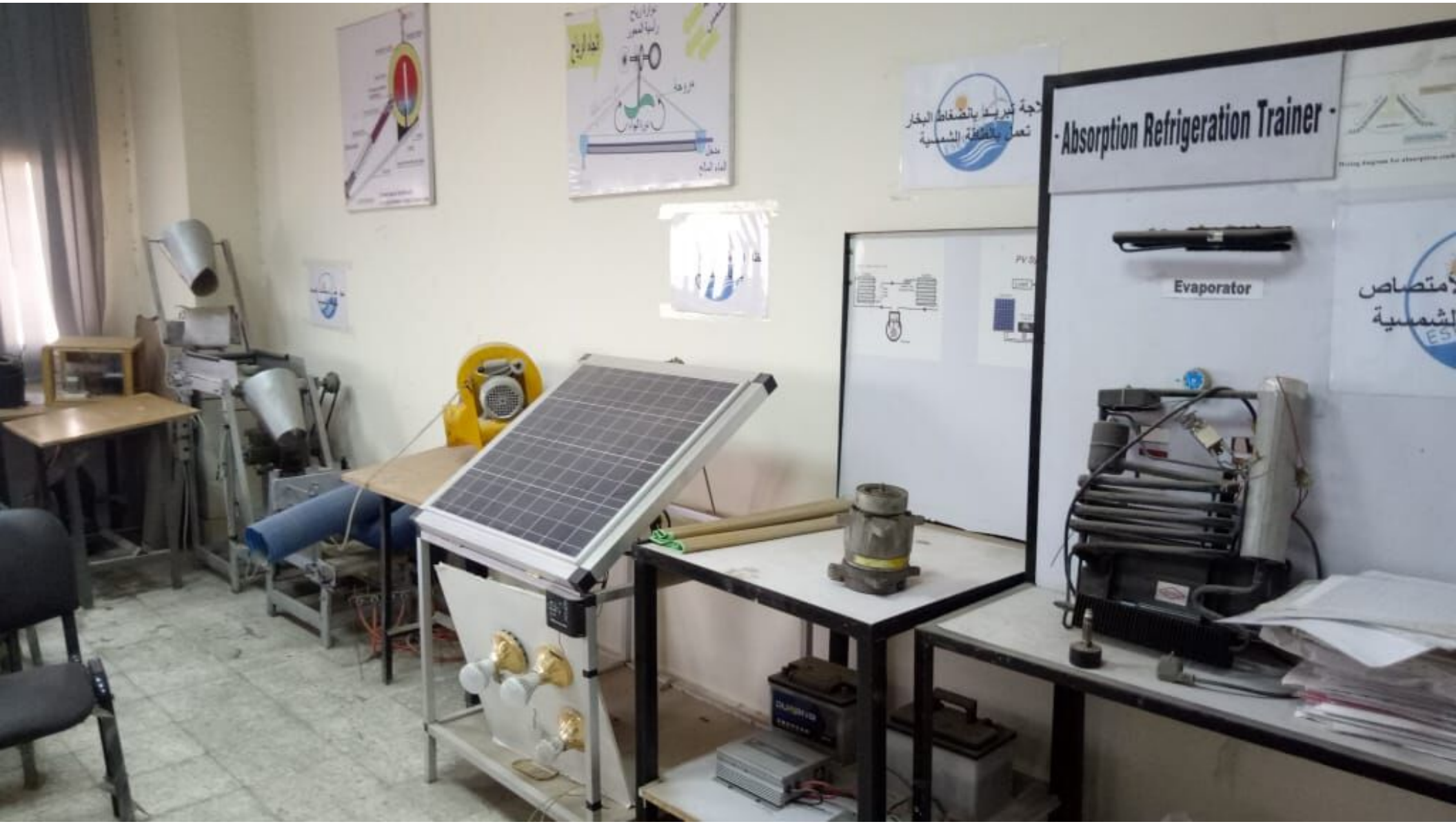


2/3 التسهيلات المادية الداعمة:

2/2/3 المعامل والتسهيلات الفنية الداعمة

معمل الطاقة الشمسية



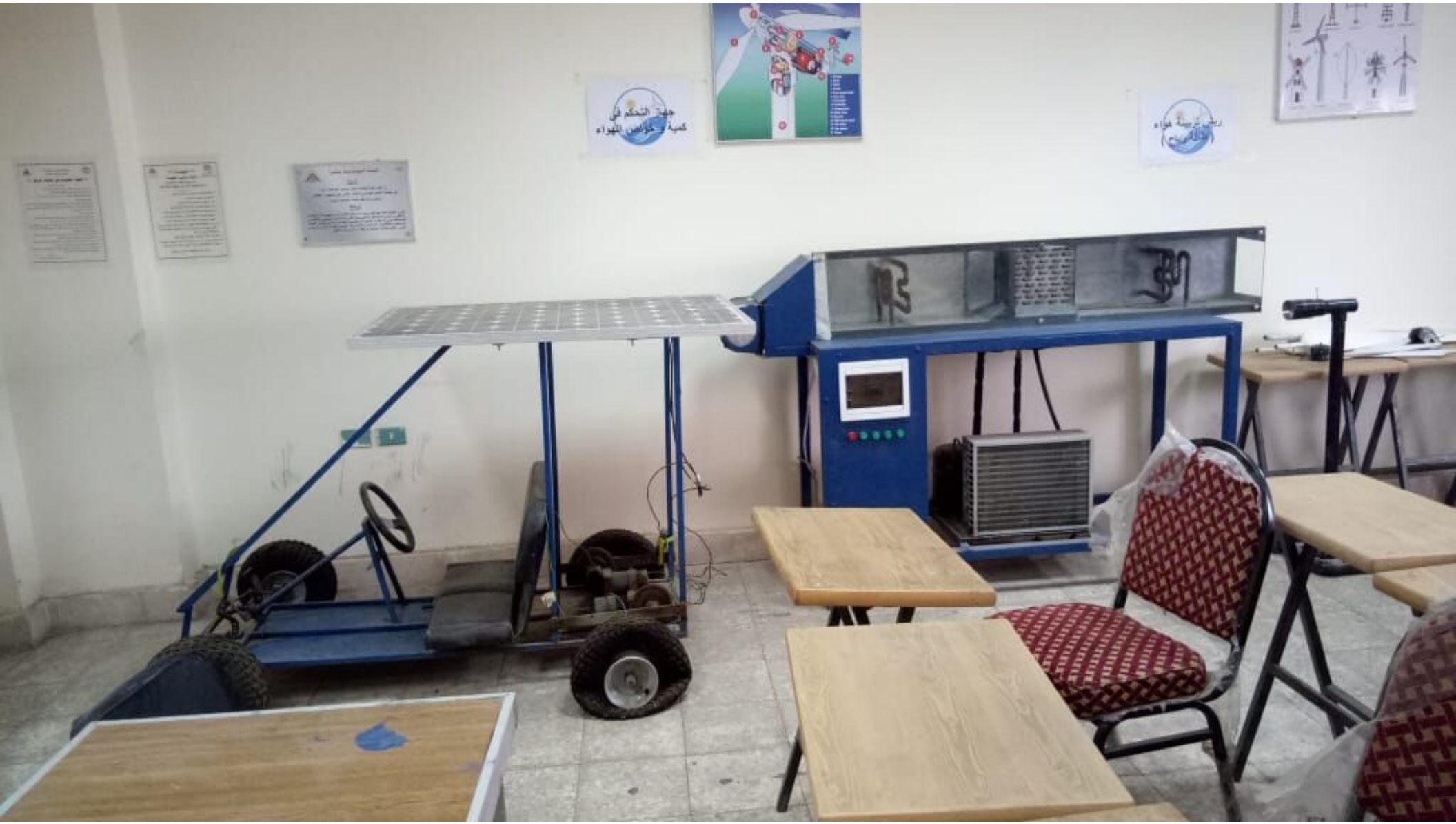

Absorption Refrigeration Trainer
Evaporator

2/3 التسهيلات المادية الداعمة:

2/2/3 المعامل والتسهيلات الفنية الداعمة

معمل طاقة الرياح


جهاز اضاءة تمثيلى
لاشعة الشمس



2/3 التسهيلات المادية الداعمة:

2/2/3 المعامل والتسهيلات الفنية الداعمة

التقييم الكمى للمساحات

نموذج حصر المرافق والتجهيزات لبرنامج هندسة الطاقة
للعام الجامعى 2020 / 2021

	الحصر	العدد
المرافق و التجهيزات العامة	عدد المدرجات	-
	عدد الفصول الدراسية	2
	عدد المعامل الطلابية	13
	عدد المعامل البحثية	-
	عدد معامل الحاسب الالي	1
	عدد المكتبات	1
	عدد المطاعم	-
	عدد استراحات الطلبة	-
	عدد دورات المياه	2
	عدد المساجد	1
مقتنيات المكتبة	عدد الدوريات الالكترونية في تخصصات البرنامج: رابط بنك المعرفة المصري: https://www.ekb.eg/ar/home;jsessionid=gowA7XOVmWxMjqGJgzdy3yCC.undefined رابط اتحاد المكتبات المصرية: http://srv4.eulc.edu.eg/eulc_v5/libraries/start.aspx رابط مكتبة هندسة شبرا: http://srv4.eulc.edu.eg/eulc_v5/libraries/Start.aspx?fn=DrawInterFace&ScopeID=1.19.3.	
	عدد المراجع الاجنبية في التخصص	
	عدد المراجع الحديثة المضافة للمكتبة في التخصص	
البنية التحتية لتكنولوجيا المعلومات	عدد اجهزة الحاسب	30
	عدد نقاط الانترنت	-
	عدد الداتا شو	3
المرافق و التجهيزات الصحية	عدد العيادات الطبية	1
	عدد الكادرالطبي	
	عدد الاجهزة (التخصصات) الطبية	

التقييم الكمي للمساحات والتجهيزات والأجهزة والموارد البشرية (Norms)

المرفق	حصر بمساحات و استيعاب المرفقات الخاصة ببرنامج هندسة الطاقة و الطاقة المستدامة						
		المساحة م2	عدد النوافذ	الاضاءة	عدد الطلاب	المساحة / الطالب	الاستيفاء √ - x
قاعات	NP301	26	2	4	25	1.04	√
	NP302	26	2	4	25	1.04	√
	المساحة الاجمالية	52	4	8	30	2.08	
المعامل	معمل الحاسب الالي	90,72	2	9	25	3.63	√
	معمل التبريد قسم ميكانيكا	90,4787	2	10	25	3.62	√
	معمل ابحاث التبريد قسم ميكانيكا	68,9225	2	10	25	2.76	√
	معمل اساسيات قسم ميكانيكا	89,2365	2	10	25	3.57	√
	معمل ابحاث تكييف الهواء قسم ميكانيكا	63,8275	3	10	25	2.55	√
	معمل ابحاث تكييف الهواء قسم ميكانيكا	73,2431	3	10	25	2.93	√
	معمل الطاقة الشمسية	85,6	2	9	25	3.42	√
	معمل طاقة الرياح	87,42	2	9	25	3.5	√
	المساحة الاجمالية	649,4483	18	77	200	3.25	√
المكتبة		230	12	30	100	2.3	√
المسجد	مصلى رجال	8	2	3	10	0.8	√
	مصلى طالبات	-	-	-	-	-	x
دورات المياه	للرجال	8	1	4	4	2	√
	للسيدات	8	1	4	4	2	√
	لاعضاء هيئة التدريس رجال	4	1	2	1	4	√
	لاعضاء هيئة التدريس سيدات	-	-	-	-	-	x
	المساحة الاجمالية	258	17	43	119	11.1	

كلية الهندسة بشبرا
FACULTY OF ENGINEERING AT SHOUBRA

كلية الهندسة بشبرا
البرامج الجديدة

قـــرار تنفيـــذي

تمت المصادقة بجلسة مجلس الكلية رقم (1) بتاريخ 21/ 9 /٢٠٢١ علي موافقة مجلس إدارة برنامج هندسة الطاقة والطاقة المستدامه لشهر سبتمبر بجلسته رقم (٩٣)بتاريخ ٢٠٢١/٩/٢٠ علي إعتماد تحديث التقييم الكمى للمساحات المخصصة لبرنامج هندسة الطاقة والطاقة المستدامة.

وكيل الكلية لشئون التعليم والطلاب
والمشرف العام علي البرامج الجديدة

أ.د/ جمال السيد عبد العزيز

عميد الكلية ورئيس مجلس
ادارة البرامج الجديدة

أ.د/ أيمن الشهابي

الممسوحة ضوئيا بـ CamScanner

2/3 التسهيلات المادية الداعمة:

2/2/3 المعامل والتسهيلات الفنية الداعمة

الخطة الدراسية

نموذج خطة دراسية

Sample Study Plan

السنة الأولى
(المستوى صفر)

الفصل الدراسى الاول:-

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
EMP101	Engineering Mathematics (1)	3	2	2	-	100	---
EMP103	Physics (1)	3	2	-	3	100	---
EMP105	Engineering Chemistry	3	2	-	3	100	---
EMP106	Engineering Mechanics (1)	3	2	2	-	100	---
MDP101	Engineering Drawing (1)	3	2	-	3	100	---
GEN101	English Language	2	2	-	-	100	---
		17	12	4	9	600	

الفصل الدراسى الثانى:-

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
EMP102	Engineering Mathematics (2)	3	2	2	-	100	EMP101
EMP104	Physics (2)	3	2	-	3	100	EMP103
EMP107	Engineering Mechanics (2)	3	2	2	-	100	EMP106
CPE101	Computer Programming	3	2	-	3	100	---
MDP103	Production Technology & Workshops	3	2	-	3	100	---
MDP102	Engineering Drawing (2)	3	2	-	3	100	MDP101
GEN102	Engineering & Society	2	2	-	-	100	---
		20	14	4	12	700	

السنة الثانية
(المستوى الأول)

الفصل الدراسى الاول:-

.

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
EMP201	Engineering Mathematics (3)	3	2	2	-	100	EMP102
MPE201	Thermodynamics	3	2	-	3	100	EMP103
MDP201	Materials Science	3	2	-	3	100	EMP105
MDP202	Manufacturing Technology	2	1	-	3	100	MDP103
MDP203	Computer Aided Mechanical Drawing	3	2	-	3	100	MDP102
GEN201	Technical Report Writing	2	2	-	-	100	GEN101
		16	11	2	12	600	

الفصل الدراسى الثانى:-

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
EMP202	Engineering Mathematics (4)	3	2	2	-	100	EMP201
EMP203	Physics (3)	3	2	2	-	100	EMP104
MPE202	Fluid Mechanics	3	2	-	3	100	EMP103
MDP204	Mechanics & Testing of Materials	3	2	-	3	100	MDP201
EPM201	Electrical Engineering I	3	2	2	-	100	EMP103
GEN202	Psychology & Organization Behavior	2	2	-	-	100	---
		17	12	6	6	600	

السنة الثالث
(المستوى الثانى)

الفصل الدراسى الاول:-

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
MPE301	Heat & Mass Transfer	3	2	-	3	100	MPE201
MPE302	Applied Fluid Mechanics	3	2	2	-	100	MPE202
ELC301	Electronic Engineering	3	2	2	-	100	EPM301
EMP301	Organic Chemistry	2	1	2	-	100	EMP105
MDP301	Machine Components Design	2	1	2	-	100	MDP204
EPM302	Electrical Engineering II	2	1	2	-	100	EPM201
GEN301	Leadership and Management skills	2	2	-	-	100	---
		17	11	10	3	700	

الفصل الدراسى الثانى:-

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
MPE303	Measurements & instrumentation Systems	3	2	-	3	100	EMP104
ESE380	Field Training I	1	1				
MPE304	Applied Thermodynamics	3	2	2	-	100	MPE201
EPM301	Electrical Power Engineering	3	2	2	-	100	EPM201
MDP302	Theory of Machines	2	1	2	-	100	EMP107
MPE305	Numerical Methods for Engineers	3	2	-	3	100	EMP202
GEN302	Professional Ethics	2	2	-	-	100	-
		17	12	6	6	600	

*** يقوم الطالب بأداء تدريب فى فترة الصيف لمدة 3 أسابيع فى أحد المصانع أو المؤسسات أو الشركات فى مجال التخصص.**

السنة الرابعة
(المستوى الثالث)

الفصل الدراسى الاول: -

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
ESE401	Sustainable Energy Utilization	2	1	2	-	100	MPE201
MDP401	Vibration & Dynamics	3	2	-	3	100	MDP302
EPM401	Electrical Machines	3	2	-	3	100	EPM301
ESE402	Fuel & Advanced Combustion	3	2	-	3	100	MPE304
ESE4XX	Elective (1)	3	2	2		100	---
GEN401	Legislations, contract and procurement management	2	2	-	-	100	---
		16	11	4	9	600	

الفصل الدراسى الثانى: -

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
ESE403	Energy & Conservation Management	3	2	2	-	100	ESE401
MPE401	Applied Heat & Mass Transfer	3	2	-	3	100	MPE301
ESE404	Bioenergy	3	2	2	-	100	EMP301
ESE405	Solar Energy	3	2	2	-	100	ESE401
ESE4XX	Elective (2)	3	2	2	-	100	---
ESE480	Field Training II	1	1				
GEN402	Human Resources Management	2	2	-	-	100	---
EPM402	Power System Analysis	3	2	2	-	100	EPM301
		21	15	10	3	700	

*** يقوم الطالب بأداء تدريب فى فترة الصيف لمدة 3 أسابيع فى أحد المصانع أو المؤسسات أو الشركات فى مجال التخصص.**

السنة الخامسة
(المستوى الرابع)

الفصل الدراسى الاول: -

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
ESE501	Energy Economics	2	1	2	-	100	ESE401
ESE502	Wind Energy	3	2	2	-	100	MPE302
MDP501	Control Systems analysis & Design	3	2	-	3	100	MDP401
ESE503	Solar Cells Fundamentals	3	2	2	-	100	ESE405
ESE5XX	Elective (3)	3	2	2	-	100	---
ESE591	Project (1)	3	3	-	-	100	120 CR
		17	12	8	3	600	

الفصل الدراسى الثانى: -

Code	Subject	Credit Hours	Contact Hours			Marks	Prerequisites
			Lec.	Tut	Lab		
ESE504	Power Stations	3	2	2	-	100	MPE304
ESE505	Computer Applications in Fluid Mechanics	2	1	-	3	100	MPE305, MPE302
ESE506	Energy Storage & Transmission	3	2	2	-	100	ESE403, ESE501
EPM501	Power Electronics	3	2	-	3	-	ELC301
ESE5XX	Elective (4)	3	2	2	-	100	---
ESE592	Project (2)	3	3	-	-	100	ESE591
		17	12	6	6	500	

اجمالي عدد المواد: 65 مادة اجمالي ساعات الخطة: 175 ساعة

وصف المقررات الدراسية
Courses Description

Course Title	Thermodynamics					
Course Code	MPE201					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	EMP103					
Course Description	Introduction (some processes that occur in equipments; power plant, vapor compression refrigerator, …) – Fundamental concepts and definitions (Thermodynamic system and control volume – process and cycle – point and path function – specific properties) – Properties and state of a Substance (Pure substance – vapor, liquid, solid phae equilibrium – Independent properties table) – Work and Heat (work done at moving boundary – work system – Heat transfer modes) – First law of thermodynamics (control mass and control volumes and their conservations) – Internal energy and enthalpy – The second low of thermodynamics (heat engine and Refrigerators – reversible process – Carnot cycle – ideal gas) – Entropy system property – thermodynamic property					

	relation – principle of increase of entropy) – Irreversibility and Availability Processes (available energy, reversible work, and availability and seond-law efficiency) – Applications for steady state and steady flow – Uniform flow and some processes.

Course Title	Materials Science					
Course Code	MDP201					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	EMP105					
Course Description	Introduction to materials science, atomic structure, bonds, crystalline structure, mechanical properties of materials, metals, ceramics, polymers, composites, electrical, thermal, and magnetic properties of materials, materials selection for engineering applications.					

Course Title	Manufacturing Technology					
Course Code	MDP202					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MDP103					
Course Description	Introduction to Manufacturing Processes - Engineering Materials – Metrology - Fundamentals of Metal Casting - Metal Casting Processes - Powder Metallurgy - Forming (Hot and Cold Working of Metals) - Forming (Forging, Extrusion) - Forming (Sheet Metal Working)- Metarial Removal Processes (Turning, Drilling, Milling) - Metarial Removal Processes (Turning, Drilling, Milling) - Metarial Removal Processes (Cutting Tools) - Joining (Welding).					

Course Title	Physics (3)					
Course Code	EMP203					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	EMP104					
Course Description	Dipole-Electrical Capacity-Force acting on charges-electrical Insulators-Polarization- X-Ray-Introduction to Lasers and nano materials.					

Course Title	Fluid Mechanics					
Course Code	MPE202					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	EMP103					
Course Description	Fluid properties, fluid statics, fluid motion, pressure variations in fluid flows, momentum principles, energy principles, dimensional analysis and similitude, surface resistance, flow in conduits , flow measurements , drag , and lift.					

Course Title	Organic Chemistry					
Course Code	EMP301					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	EMP105					
Course Description	Molecular composition and structure of organic compounds: determination and calculation of empirical and molecular formulae, pictorial treatment of hybridization. Organic Reaction Mechanisms: Bond formation and fission,					

	classification of reagents and reactions, reaction intermediates: Carbocations, free radicals, carbanions. Substitution, additional and elimination reaction. Stereochemistry Hydrocarbons: (aliphatic, alicyclic and aromatic), structure and nomenclature. Homologous series, and gradation of properties, preparation, reactions.

Course Title	Mechanics & Testing of Materials.					
Course Code	MDP204					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MPD201					
Course Description	Definitions of stress and strain, uniaxial loading, torsion, bending moments and shear forces in beams, bending stresses and shear stress in beams, stress transformation, and compound stresses. Mechanical tests: tensile, compression, shear, hardness, creep and fatigue.					

Course Title	Electrical Engineering I					
Course Code	EPM201					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	EMP103					
Course Description	SI units, electrical potential, resistance, Electric current and Ohm's law, Resistance in series, Voltage divider rule, Kirchhoff's laws, Maxwell's loop current method, Mesh analyses, Nodal analyses, Superposition theorem, Thevenin equivalent circuit, Norton equivalent circuit, Star/delta transformation, Maximum power transfer theorem, Periodic functions, Sinusoidal functions, Time shift and phase shift, The average and effective values, Non periodic functions, The unit step function, The unit impulse function, Damped sinusoids, random signals, Types of capacitors, capacitors, Charging and discharging of a capacitor with initial charge. Self-inductance, Mutual inductance, coefficient of coupling, inductances in series and parallel, Energy stored in magnetic field, rise of current in inductive circuit, Thevenin's and Norton's Theorems, Superposition of AC sources, AC Bridges, AC power, Complex power, Power factor improvement, maximum power transfer, Poly-phase circuits, Three phase systems, Y-Δ systems, High pass and Low pass filters networks, half power frequencies, Ideal and Practical filters, Exponential Fourier series, Applications in circuit analysis, Fourier transform of non-periodic waveforms, Two port networks.					

Course Title	Heat & Mass Transfer					
Course Code	MPE301					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MPE201					
Course Description	Introduction to heat and mass transfer. Steady-state and unsteady-state heat transfer. Steady-state and unsteady-state mass transfer. Interphase transport and transfer coefficients. Convective heat and mass transfer. Internal and external forced convection. Heat transfer equipment. Natural convection. Boiling and condensation. Radiation heat transfer.					

Course Title	Measurements & Instrumentation Systems					
Course Code	MPE303					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	EMP104					
Course Description	The selection and application of transducers; the dynamic response of measurement systems; methods of data acquisition and recording; uncertainty analysis; data reduction and presentation of results; and the different roles of					

	measurements in engineering practice. The laboratory provides hands-on experience with practical measurements of pressure, temperature, strain, position and velocity.

Course Title	Electronic Engineering					
Course Code	ELC301					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	EPM301					
Course Description	Introduction to semiconductor materials and devices. DC, AC analysis of transistor circuits (BJT, MOSFET). Amplifier circuits, bandwidth considerations; feedback and stability. Operational amplifiers and applications in filter and oscillator circuit design. Voltage regulator and timer circuits. Switching properties of transistors and digital gates (Inverter, NAND/AND, NOR/OR); overview of TTL and CMOS technologies.					

Course Title	Theory of Machines					
Course Code	MDP302					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	EMP107					
Course Description	Kinematics and dynamics of machinery; linkages, geometry of motion, mobility; velocity and acceleration analysis by graphical, analytical, and numerical techniques; static and dynamic force analysis in machinery; engine analysis; flywheels; balancing; Governers; Cams; Clutches and brakes; Gyroscope.					

Course Title	Applied Fluid Mechanics					
Course Code	MPE302					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	MPE202					
Course Description	Surface flow resistance – Boundary layer for laminar and turbulent flows - Laminar and turbulent flows through pipes and calculation of friction and secondary losses – Different piping systems – Shock waves of compressible fluids – One dimensional compressible flow – Isentropic flow – Fluid flow measurements – Introduction to hydraulic machines.					

Course Title	Applied Thermodynamics					
Course Code	MPE304					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	MPE201					
Course Description	Introduction &Review: First law of thermodynamics- reversible thermodynamic processes- Second Law of Thermodynamics: Kelvin-Planck Statement- Calusius Statement- Heat engine – Reversed engine (Refrigerator-heat pump)- Carnot cycle-Entropy: Clausius inequality-Entropy-Entropy changes in reversible processes- principle of increase entropy -Availability &Irreversibility-Steam Cycle: Simple steam cycle (Rankine cycle)- Reheat cycle- Regenerative cycle-Air standard cycle: Otto cycle- Diesel Cycle- Dual Cycle-simple gas turbine cycle -					

	Refrigeration cycle- Gas mixtures General considerations and mixtures of ideal gases--simplified model of mixture involving gases and vapor- the first law applied to gas-vapor mixture Thermodynamic relations: The Clapeyron Equation- Maxwell relations-Some thermodynamic relation involving Enthalpy, internal energy and entropy- Chemical reaction: Fuels-Combustion process

Course Title	Electrical Power Engineering					
Course Code	EPM301					
Credit Hours	3					
Contact Hours	Lecture	2	Tutorials	2	Lab.	-
Prerequisite(s)	EPM201					
Course Description	Transmission line parameters, Short, medium and long transmission lines, The transmission line as two-port networks, Power flow on transmission lines, Travelling wave, Underground cables construction, types, parameters and ampicity calculations, Cable testing and fault locating, Grounding systems.					

Course Title	Electrical Engineering II					
Course Code	EPM302					
Credit Hours	2					
Contact Hours	**Lecture**	1	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	EMP201					
Course Description	Alternating voltages and currents, AC circuit theories, Ac power and power factor correction, polyphase circuits, Frequency response, Filters and Resonance, Two port networks, Fourier method.					

Course Title	Electrical Machines					
Course Code	EPM401					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	EPM301					
Course Description	D.C. Generators (Types and Characteristics), Open Circuit Characteristic of a D.C. Generator, Characteristics of a Separately Excited D.C. Generator, Voltage Build-Up in a Self-Excited Generator, Critical Field Resistance for a Shunt Generator, Critical Resistance for a Series Generator, Characteristics of Series Generator, Characteristics of a Shunt Generator, Critical External Resistance for Shunt Generator, Critical Speed (NC), Compound Generator Characteristics, Voltage Regulation, Parallel Operation of D.C. Generators, D.C. Motors, Back E.M.F., Voltage and power equations of D.C. Motor, Condition For Maximum Power, Types of D.C. Motors, Armature and shaft Torque of D.C. Motor, Brake Horse Power, Speed of a D.C. Motor, Efficiency of a D.C. Motor, Speed Control of D.C. Motors, Transformer, Theory of an Ideal Transformer, Practical Transformer, Practical Transformer on Load, Equivalent circuit, Voltage Regulation, Transformer Tests, Efficiency of a Transformer, Condition for Maximum Efficiency, All-Day Efficiency, Types of Transformers, Cooling of Transformers, Autotransformer, Parallel Operation of Single-Phase Transformers, Three-Phase Transformer. Three-phase synchronous machines: types, characteristics phasor diagram, power, torque, voltage regulation and efficiency, modes of operation. Three-phase induction machines: theory and principles, equivalent circuit and phasor diagram, characteristics, power, torque, efficiency, stability and dynamic behavior, modes of operation.					

Course Title	Applied Heat & Mass Transfer					
Course Code	MPE401					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MPE301					
Course Description	Fourier conduction equation, cylindrical and spherical surfaces, application on simple and compound walls. Critical radius of insulation. Extended surfaces (fins), Unsteady conduction for lumped and unlumped systems. General conduction equations for two and three dimensional for steady and unsteady cases. Study of parameters affecting convection, relations for free and forced convection for inner and outer surfaces. Heat exchangers. Plank's theory for thermal radiation, view factors and surface properties to identify surface resistance. Draw equivalent electric circuits. Radiation from gases and emissivity charts for H_2O and CO_2. Mass transfer.					

Course Title	Bioenergy					
Course Code	ESE404					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	EMP301					
Course Description	Introduction - Types of Bio-resources - Potential - Characteristic of Bio-resources - Origin, characteristics, use, cost, advantages and disadvantages of different biomass resources: agricultural energy crops, woody crops/trees, crop residues, forest residues and thinnings, and animal waste. technologies for producing biofuels such as ethanol, biodiesel and bio-oils, including corn-to-ethanol, sugar cane to ethanol (Brazil), biodiesel from oil crops like soybeans, ethanol from ligno-cellulosic biomass, and bio-oils from fast pyrolysis of fibrous biomass. Costs, uses and markets for biofuels. Technology and Applications (Thermal, Chemical and Biochemical Conversion). technologies for producing biopower, including combustion and/or gasification – steam or gas turbines, fuel cells, and anaerobic digestion of manures to produce methane.					

Course Title	Solar Energy					
Course Code	ESE405					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	ESE401					
Course Description	Study of solar thermal energy: Its intensity in outer space and the calculation of the solar intensity on earth with different models. Availability and usability of solar energy. Study of solar angles, Shades and the equation of time. Theory of the flat plate collector, transmission through glass, heat loss calculations and definitions of all parameters involved in collector performance. Solar concentrators: Solar I (Heliostat), Point concentrators, Parabolic through, Fresnel concentrators. Thermal performance, heat transfer coefficients, efficiencies. Array design and energy conversion. photovoltaic, solar tracking and solar satellite systems					

Course Title	Energy Conversion and Environmental Protection					
Course Code	ESE501					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	ESE403					
Course Description	Energy and Society - Forms of Energy - Measurement of Energy - Sources of Energy – Power - Energy Use of Some Home Appliances - Energy Supply and Demand - Global Energy Consumption – Egypt Energy Consumption - Growth in the Energy Demand - Energy Reserves - Energy Efficiency - What is Thermal Energy and How is It Measured - Energy and the Environment - Products of Combustion - Heath and Environmental - Effects of the Primary Pollutants - Secondary Pollutants - Home Heating Basics - Mechanisms of Heat Loss or Transfer - Conduction Heat Losses - Calculation of Home Heat Loss - Fuel Choices for Home Heating - Energy Costs - Home Heating Systems - Central Ducted Air Systems - Radiant Heating Systems - Direct or In Situ Heating Systems - Cooling and Heating/Cooling Systems - Heat Movers - Ground Source (Geothermal) Heat Pumps - Solar Energy for Home Heating - Home Heating: Your “Power” in the Environmental Protection - Home Cooling - How do We Measure Humidity? - How does an Air Conditioner Work? - Types of Air Conditioners - Saving Energy - Home Cooling: Your “Power” in the Environmental Protection – Windows – Lighting – Appliances.					

Course Title	Wind Energy					
Course Code	ESE502					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	MPE302					
Course Description	Windmills and Wind Turbines, Global Installations, Wind Energy System Components, Blades, hub, nacelle, Gearbox, generator, brakes, Tower, foundation, control system, Turbine Design, Drivetrain Components, General Principles Primer (stress, strain, vibrations), Rotor Dynamics, Power Converters and Ancillary Equipment , Wind Turbine Control, Wind Farm Feasibility Studies, Wind Turbine Siting, Noise Issues.					

Course Title	Solar Cells Fundamentals					
Course Code	ESE503					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	ESE405					
Course Description	Sunlight energy, photovoltaic devices, energy conversion, solar radiation measurement, Applications, Principles of solar cell operation, structure, electrical and optical characteristics, equivalent circuit, Crystalline silicon solar cells, Thin film technologies for PV, Energy production by a PV array, Energy balance in stand ‹alone PV systems, Standards, calibration and testing of PV modules and solar cells, PV system monitoring, Safety considerations in PV Systems, Site assessment, System design. Maximizing cell efficiency, Solar cell construction, Types and adaptations of photovoltaics, Photovoltaic circuit properties, Applications and systems, Social and environmental aspects					

Course Title	Energy Storage & Transmission					
Course Code	ESE506					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-

Prerequisite(s)	ESE403, ESE501
Course Description	Introduction to energy resources, conversion, transmission & distribution, consumption. Forms of energy: Units of energy and power and important physical constants. , Conservation of energy, energy conversion techniques. Electricity generation, transmission and storage. Energy consumption; Domestic and Industrial. Case studies. Introduction to green energy policy and climate change mitigation. Renewable energy systems: Wind power, Hydropower, Solar, Biomass and Biofuel, Geothermal. Case studies of major installations. Economics and politics of renewable energy systems.The structure, design and efficiency of electrical transmission grids will be introduced. Power electronic devices and their use in energy storage and conversion will be presented. Emphasis will be on the development of an integrated approach for the storage and transmission of energy and cost versus efficiency trade-off analysis of such systems.

Course Title	Power Stations					
Course Code	ESE504					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	MPE304					
Course Description	Steam power plants (Analysis of steam cycles (Rankine cycle, End conditions, Reheat cycle, Regenerative cycle, Power plant development, and Cogeneration) – Plant components (Turbines – Steam generators – Ancillary Systems) – Thermal analysis and power plant performance – Plant Operation and Control. Gas turbine power plant (simple plant components – Thermal Analysis and performance of each component (Inetrcooling – Reheat – Regenerative – Water injection). Steam/Gas turbine power plant (Combined Cycle). Desalination Plants (Principles of Sea water desalination – Operational techniques of thermal desalination – Desalination process categories – Multi-Effect Distillation (MED) – Multi-Stage Flash Distillation (MSF) – Reverse Osmosis (RO) – Forward Reverse Osmosis (FRO) – Plant economy and selection).					

Course Title	Power Electronics					
Course Code	EPM501					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab**.	-
Prerequisite(s)	ELC301					
Course Description	Power semiconductor devices: types, construction, characteristics and rating values. Operation and performance analysis of single-phase and three-phase uncontrolled, controlled and semi-controlled rectifier circuits with different loads. Effect of supply and load inductances on the performance of rectifier circuits. Operation and performance analysis of single-phase voltage-source inverter circuits. Electronic control circuits of alternating voltage: methods of control, operation and performance analysis of single-phase and three-phase alternating voltage regulators. DC chopper circuits: operation, performance analysis of step-down and step-up chopper circuits. Performance analysis of direct voltage regulators.					

Course Title	Energy Economics					
Course Code	ESE501					
Credit Hours	2					
Contact Hours	**Lecture**	1	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	ESE401					
Course Description	Principles of economical science and engineering economy – Cost estimating and cost terminology – Interacting between markets and the environment – Economics of reneable resources – Feasibility of projects - Environmental					

	impacts - Economics of carbon – Aconomics of alternatives and their relationship to sustainability energy - Economic analysis of a transmission system, tariffs, power factor, all ‹thermal generation allocation problem, hydro ‹thermal coordination, new energy resources. Transmission access fees assessment and calculations. Computer Applications using Microsoft Excel and MiniTab.

Course Title	Computer Aided Mechanical Drawing					
Course Code	MDP203					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MDP102					
Course Description	Lecture and labs intended to enable students to use computer aided drafting and design software such as Autocad or Solidworks…etc. The course Includes sections in machine members – Assembly and working drawings – fits and tolerances – geometrical tolerances – surface texture – welding symboles.					

Course Title	Numerical methods for engineers					
Course Code	MPE305					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	EMP202					
Course Description	Quantitative Engineering Activities: Analysis and Design Selected Categories of Numerical Methods and Applications – Linearization – Finding Roots of Functions – Solving Systems of Equations – Optimization – Numerical Integration and Differentiation – Selected Additional Applications – Matlab Example: Fixed Point Iteration – Matlab Example: Numerical Integration.					

Course Title	Energy & Conservation Management					
Course Code	ESE403					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	ESE401					
Course Description	Energy management - Fuels and utilities – Electricity - Natural gas -Fuel oil – Steam -Fuel comparison methods - Energy accounting - Calculating the Energy Use Index - Analyzing consumption & evaluating -Energy Conservation Opportunities - Types of Opportunities / Common measures - Basic Test Instruments - Operation and Maintenance - Energy Management Planning/Strategies - Pulling it All Together - Identify operation, maintenance, and conservation priorities.					

Course Title	Vaibration & Dynamics					
Course Code	MDP401					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MDP302					
Course Description	Mechanical Vibration: Introduction, Study and analysis of single and multi degree of freedom systems (transverse and torsional), Free undamped, Free damped and forced vibration, Whirling of shafts, Design of vibration absorber, Dynamic stresses, Critical speed of shafts, Vibration isolation, Vibration of two degree of freedom systems (free, forced), Vibration absorber, Torsional vibrations (free, forced), Dynamic stresses, Equivalent torsional systems: Geared system, Crank system, Vibration of multi ‹degree of freedom systems (free, forced), Critical speeds of shafts: Shafts with lumped masses, Shafts with distributed masses.					

Course Title	Computer Applications in Fluid Mechanics					
Course Code	ESE505					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MPE305, MPE302					
Course Description	The course deals with how to set up and solve thermal-fluid problems with the ANSYS/CFX computational fluid dynamics code. The course requires each student to build a computational model of a practical thermal-fluids problem using CFX. Students will learn how to use ANSYS/CFX modules by recreating and modifying tutorials taken from the User Manual.					

Course Title	Project (1)					
Course Code	ESE591					
Credit Hours	3					
Contact Hours	**Lecture**	-	**Tutorials**	6	**Lab.**	-
Prerequisite(s)	120 Credit Hours					
Course Description	This course requires the students, working in teams, to take an actual engineering project from the initial proposal stage through the preliminary design phase. Students will conduct the necessary activities and prepare the various documents needed to complete the preliminary design.					

Course Title	Project (2)					
Course Code	ESE592					
Credit Hours	3					
Contact Hours	**Lecture**	-	**Tutorials**	6	**Lab.**	-
Prerequisite(s)	ESE591					
Course Description	A continuation of ESE591, the design process will continue from the preliminary phase to the completion of a conceptual design of the project. The students, working in teams, will prepare design criteria, calculations, and representative engineering drawings of the project's major components. A list and general description of the many details and other miscellaneous activities required to complete the project will also be prepared.					

Course Title	Field Training I			
Course Code	GETR 101			
Credit Hours	-			
Contact Hours	**Lecture**	-	**Lab/Tut.**	-
Prerequisite(s)	80 Credit Hours			
Days/Contact Hours	15 Working Days/120 Hours			

Course Title	Field Training II			
Course Code	GETR 102			
Credit Hours	-			
Contact Hours	**Lecture**	-	**Lab/Tut.**	-
Prerequisite(s)	120 Credit Hours			
Days/Contact Hours	15 Working Days/120 Hours			

Course Title	Machine Components Design					
Course Code	MDP301					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	MDP204					
Course Description	The student learns about the design of linkages, cams, gears, gear trains, welded and brazed joints, springs, shafts, Bears, Bearings and flexible elements					

	for both static and dynamic loads.

Course Title	Control Systems Analysis & Design					
Course Code	MDP501					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MDP401					
Course Description	Introduction - what is a system? - system fundamentals - types of systems - the study of systems analysis - preparing for a career in systems analysis - formal organization structure - tools of the systems analyst - system modeling - traditional design tools - the planning phase – project management - project concepts - need for project management - the analysis phase - quantitative assessments - fact-finding techniques - the design phase – input design and control – out put system design – system development – system implementation – system evaluation and optimization. Computer applications using MATLAB packages.					

Course Title	Fuel & Advanced Combusion					
Course Code	ESE402					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	-	**Lab.**	3
Prerequisite(s)	MPE304					
Course Description	This course aims to teach the basic principles of combustion highlighting the role of chemical kinetics, fluid mechanics, and molecular transport in determining the structure of flames. Students will become familiar with laminar and turbulent combustion of gaseous and liquid fuels including the formation of pollutants. They will also be briefly introduced to various applications such as internal combustion engines, gas turbines, furnaces and fires.This UoS will cover equilibrium compositions, flammability limits, simple chemically reacting systems, detailed chemical kinetics, and the basic theory underlying laminar and turbulent combustion for both premixed and non-premixed cases. An introduction to droplet combustion, the concept of mixture fraction for non-premixed flames, combustion in engines and gas turbines as well as the formation of pollutants. Fire ignition, growth and spread will also be covered with respect to safety in buildings including the hazards related to the formation of smoke and toxic products.					

Course Title	Hydraulic & Penumatic Systems					
Course Code	ESE410					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	-
Prerequisite(s)	MPE302					
Course Description	This course introduces the basic components and functions of hydraulic and pneumatic systems. Topics include standard symbols, pumps, control valves, control assemblies, actuators, FRL, maintenance procedures, and switching and control devices. Upon completion, students should be able to understand the operation of a fluid power system, including design, application, and troubleshooting.					

Course Title	Selected topics in Sustainable Energy					
Course Code	ESE411					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	--
Prerequisite(s)	---					
Course Description	Selected topics of current interest in energy engineering & Sustainable Energy.					

Course Title	AC & Ref. and Indoor Environmental Control					
Course Code	ESE412					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	--
Prerequisite(s)	MPE301					
Course Description	Heating, Ventilating, AirConditioning and refrigeration technology. Psychrometric analysis: moist air properties, psychrometric chart, unit and HVAC processes in conditioned spaces and equipments. Requirements for a comfortable and healthy indoor environment: thermal comfort models, air quality, air contaminants and their control, noise. Design requirements. HVAC systems: their selection and application. Air cleaning and filtration, air distribution and duct systems, air supply and removal from conditioned spaces. Environmental controlled systems including heating, ventilation, air conditioning and refrigeration (HVACR) emphasizing residential, - Commercial and industrial applications. Maintenance personnel, application engineering, sales, supervision, electronic temperature controls specialists and environmental systems designers. New indoor air quality requirements, increased residential and commercial construction, phase-outs of CFC refrigerants, global competition within developing countries, and the popularity of computerized controlled electronic refrigeration systems. Construction of additional agricultural food storage and processing facilities.					

Course Title	Internal Combution Engines					
Course Code	ESE413					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	--
Prerequisite(s)	ESE402					
Course Description	Classification of internal combustion engines. The fuel ‹air standard cycle, Deviations between the actual cycle and fuel air standard cycle, Combustion chambers, Fuel properties and its impact on engine performance. Friction and lubrication, Effect of engine operating conditions on friction loss, Engine performance at constant speed, Effect of engine speed on friction loss, Engine performance at variable speeds and constant load, Properties and classification on engine lubricating oil, Testing of the lubricating oil, Oil filters for the engines, Cooling loss, Effect of engine operating conditions on cooling loss, Factors affecting the cooling of the engine surfaces, Temperatures limit for the engine cooling surfaces, Engine cooling systems, The engine actual thermal cycle. Performance map and the performance of 4 ‹stroke and 2 ‹stroke engines. Supercharging: methods, turbocharging, matching of engine and supercharger. Ignition: Types and components, Conventional and electronic ignition. Governors: Types, Components and testing. Sources of pollutant emissions from internal combustion engines to the atmosphere and the methods of reducing them					

Course Title	Energy Managment					
Course Code	ESE510					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	--
Prerequisite(s)	ESE403					
Course Description	General and detailed energy auditing procedures, audit pentagon, level of responsibilities - Climatic conditions - Kyoto Protocol and the use of Carbon Based Levies - Analysis of energy use, use of cost and consumption based indices - Financial considerations - Price relationships and economics - Risk and sensitivity - The role of the Energy Manager - Monitoring and targeting techniques - Cusum plots - Contract Energy Management - The use of CHP - The					

	effect of Company Structure on the Role of Energy Management - Energy Policy.

Course Title	Marine Energy Systems					
Course Code	ESE511					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	--
Prerequisite(s)	ESE401					
Course Description	Introduction to Marine Energy Systems - Tidal, Wave. OTEC, Marine Current – Potential - Operating Principles - System Components - Applications and Case Studies - Basic Performance and Cost - Future Trends and Constraints.					

Course Title	Geothermal Energy					
Course Code	ESE512					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	--
Prerequisite(s)	ESE401					
Course Description	Overview of Geothermal Energy, Introduction (conduction, convection and radiation), Thermal Properties of Rock and Governing Equation, Heat Transfer in rock - Thermal Properties of Rock and Governing Equation, Fluid flow in rock (Fundamentals), Fluid Flow in Rock (Porous and Fractured Rock Systems), Reservoir Geomechanics (hydraulic stimulation & other issues), Direct Use of Geothermal Energy and Geothermal Heat Pump, Enhanced Geothermal System (EGS), Climate Change and Emerging Subsurface Engineering Applications (Geothermal, CO2 Geosequestration, Underground Storage System), Natural Geothermal Resources , Engineered Geothermal Resources , Introduction and Operating Principle - Geothermal Resource Potentials - System Components - Basic Performance and Cost - Applications and Case Studies - Future Prospects, Constraints and Trends.					

Course Title	Dynamic Uninterruptiple power supply system					
Course Code	ESE513					
Credit Hours	3					
Contact Hours	**Lecture**	2	**Tutorials**	2	**Lab.**	--
Prerequisite(s)	EPM401					
Course Description	Common power problems - Technologies (Offline / standby, Line-interactive, Online / double-conversion) - Other designs (Hybrid topology / double conversion on demand, Ferro-resonant, DC power, Rotary) - Applications (N+1, Multiple redundancy, Outdoor use, Internal systems) - Machine standards (Measuring efficiency, Warranty) - Difficulties faced with generator use - Communication - Batteries (Common battery characteristics and load testing, Testing of strings of batteries/cells, Series-parallel battery interactions, Series new/old battery interactions).					