

Course Code	Course Name	L-T-P	Credits	Year of Introduction
BT362	Sustainable Energy Processes	3-0-0	3	2016
<b>Prerequisite: Nil</b>				
<b>Course Objectives</b>				
<ul style="list-style-type: none"> <li>To introduce the current and potential future energy systems, covering resources, extraction, conversion, and applications, with emphasis on meeting regional and global energy needs in a sustainable manner.</li> </ul>				
<b>Syllabus</b>				
Classification of energy, extraction, conversion, and applications of solar energy, wind energy, ocean energy, biomass energy, fuel cells and hydro-dynamic systems, merits and demerits of various energy systems, energy storage.				
<b>Expected outcome</b>				
Students who successfully complete this course should be able to				
<ol style="list-style-type: none"> <li>Identify global and Indian energy sources.</li> <li>Explain capture, conversion and application of solar and wind energy.</li> <li>Explain conversion of biomass to energy.</li> <li>Explain the capture of energy from oceans.</li> <li>Explain fuel cells and energy storage routes.</li> </ol>				
<b>Reference Books</b>				
<ol style="list-style-type: none"> <li>Bansal N K, Kleemann M, Michael Meliss, <i>Renewable Energy Sources &amp; Conversion Technology</i>, Tata McGraw Hill publishing Company, New Delhi, 1990.</li> <li>Boyle, Godfrey, <i>Renewable Energy</i>, 3/e, Oxford University Press, 2012.</li> <li>S P Sukhatme, <i>Solar Energy - Principles of Thermal Collection and Storage</i>, 2/e, Tata McGraw- Hill Publishing company, New Delhi, 1996.</li> <li>Pramod Jain, <i>Wind Energy Engineering</i>, McGraw Hill, 2011.</li> <li>Donald L Klass, <i>Biomass for Renewable Energy, Fuels and Chemicals</i>, Academic Press, 1998.</li> </ol>				
<b>Course Plan</b>				
Module	Contents	Hours	Sem. Exam Marks	
I	<b>General classification of energy.</b> Conventional and non-conventional. Renewable and non-renewable. Global and Indian energy sources. Global and Indian energy consumption. Problems of fossil fuels. Environmental aspects of energy utilization. Energy and sustainable development. Energy planning. Renewable energy sources, potentials, achievements and applications.	7	15%	
II	<b>Solar energy.</b> Solar radiation. Solar thermal systems. Flat plate and concentrating collectors. Solar desalination. Solar pond. Solar cookers. Solar dryers. Solar thermal electric power plant. Solar photovoltaic conversion. Semiconductor and thin film technology. Solar cells. Solar photovoltaic power generation. Hybrid systems. Merits and limitations of solar energy.	7	15%	
<b>FIRST INTERNAL EXAM</b>				

III	<b>Wind energy.</b> Availability of wind energy, Site characteristics, Wind turbine types-horizontal axis and vertical axis-design principles of wind turbine. Wind power plants, Wind energy storage. Safety and environmental aspects. Merits and limitations of wind energy.	7	15%
IV	<b>Biomass energy.</b> Biomass resources, Biomass conversion technologies-direct combustion, pyrolysis, biomass gasification. Biogas production. Biomethanation as an aid to environment improvement. Bioethanol, biodiesel and biobutanol production. Hydrogen as fuel. Biohydrogen production. Storage of hydrogen.	7	15%
<b>SECOND INTERNAL EXAM</b>			
V	<b>Energy from the oceans.</b> Ocean thermal electric conversion. Tidal energy conversion. Geothermal energy conversion. Hydro power-global and Indian scenario. Positive and negative attributes of hydropower. Electricity from hydropower. Small hydropower.	7	20%
VI	<b>Fuel cells.</b> Alkaline fuel cells. Phosphoric acid fuel cell. Molten carbonate fuel cell. Solid oxide fuel cell, Solid polymer electrolyte fuel cell. Magneto-hydrodynamic systems. Electric vehicles. Energy storage routes like thermal, chemical, mechanical, electrical storage. Batteries.	7	20%
<b>END SEMESTER EXAMINATION</b>			

### QUESTION PAPER PATTERN:

Maximum Marks: 100

Exam Duration: 3 hours

The question paper consists of Part A, Part B and Part C.

Part A consists of three questions of 15 marks each uniformly covering Modules I and II. The student has to answer two questions (15×2=30 marks).

Part B consists of three questions of 15 marks each uniformly covering Modules III and IV. The student has to answer two questions (15×2=30 marks).

Part C consists of three questions of 20 marks each uniformly covering Modules V and VI. The student has to answer two questions (20×2=40 marks).

For each question there can be a maximum of 4 subparts.

Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE482	ENVIRONMENTAL IMPACT ASSESSMENT	3-0-0-3	2016

**Prerequisites:** Nil

**Course objectives:**

- To study the various types of environmental pollution
- To study the impact of various types of pollutants and their assessment techniques

**Syllabus:**

Pollution, Types. Air pollution-sources, effects, types of pollutants. Water pollution, characteristics of water pollutants, Solid wastes, sources, types, soil pollution, pesticide pollution. Noise pollution, Impacts, positive and negative Environmental impact assessment, steps of doing EIA, methodology adopted, EIA procedure in India, Case studies.

**Course Outcomes:**

- The students will have a basic knowledge of various pollution sources and their impacts

**Text Books / References:**

1. B.C Punmia , “Waste Water Engineering”, Laxmi Publications Pvt. Ltd,
2. Dr. PN Modi, “Sewage Treatment & Disposal and Waste water Engineering”, Standard Book House, New Delhi
3. John Glasson, Riki Therivel & S Andrew Chadwick “Introduction to EIA” University College London Press Limited
4. Larry W Canter, “Environmental Impact Assessment”, McGraw Hill Inc. , Newyork.
5. Mackenzie L Davis, Introduction to Environmental Engineering, McGraw hill Education (India)
6. Peavy H S, Rowe, D.R. Tchobanaglou “Environmental Engineering” Mc Graw Hill Education
7. Rau G J and Wooten C.D “EIA Analysis Hand Book” McGraw Hill
8. Robert A Corbett “Standard Handbook of Environmental Engineering” McGraw Hill

#### COURSE PLAN

Module	Contents	Hours	End Sem. Exam Marks %
I	INTRODUCTION: Classification of Pollution and Pollutants, AIR POLLUTION: Primary and Secondary Pollutants, air pollutants-sulfur dioxide- nitrogen dioxide, carbon monoxide, Impact of air pollutants on human, vegetation and environment, , Ambient Air Quality Standards	7	15
II	WATER POLLUTION: Point and Non-point Source of Pollution, Major Pollutants of Water, Physical, chemical and biological characteristics of water , Water borne diseases, Water Quality standards	7	15

<b>FIRST INTERNAL EXAMINATION</b>			
<b>III</b>	SOLID WASTE: Classification and sources of Solid Waste, Characteristics of Solid Waste, e waste, Radioactive wastes LAND/SOIL POLLUTION: Effects of urbanization on land degradation, Impact of Modern Agriculture on Soil, pesticide pollution, Effect on Environment	6	15
<b>IV</b>	NOISE POLLUTION: Sources of Noise, Effects of Noise, measurement of noise, Equivalent sound pressure level, Control measures	6	15,
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	Impacts of pollutants, types, scale of impact-Global, local pollutants. Climate change, Ozone layer depletion, Deforestation, land degradation Environmental impact assessment, Need for EIA,	8	20
<b>VI</b>	EIA Procedure-Screening, Scoping, EIA procedure in India, Impact analysis- checklists, matrix methods, overlay analysis, Case studies of EIA	8	20
<b>END SEMESTER EXAMINATION</b>			

**QUESTION PAPER PATTERN (External Evaluation) :**

**Maximum Marks :100**

**Exam Duration: 3 Hrs**

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V &VI : 2 questions out of 3 questions carrying 20 marks each

**Note :** 1.Each part should have at least one question from each module

2.Each question can have a maximum of 4 subdivisions (a,b,c,d)

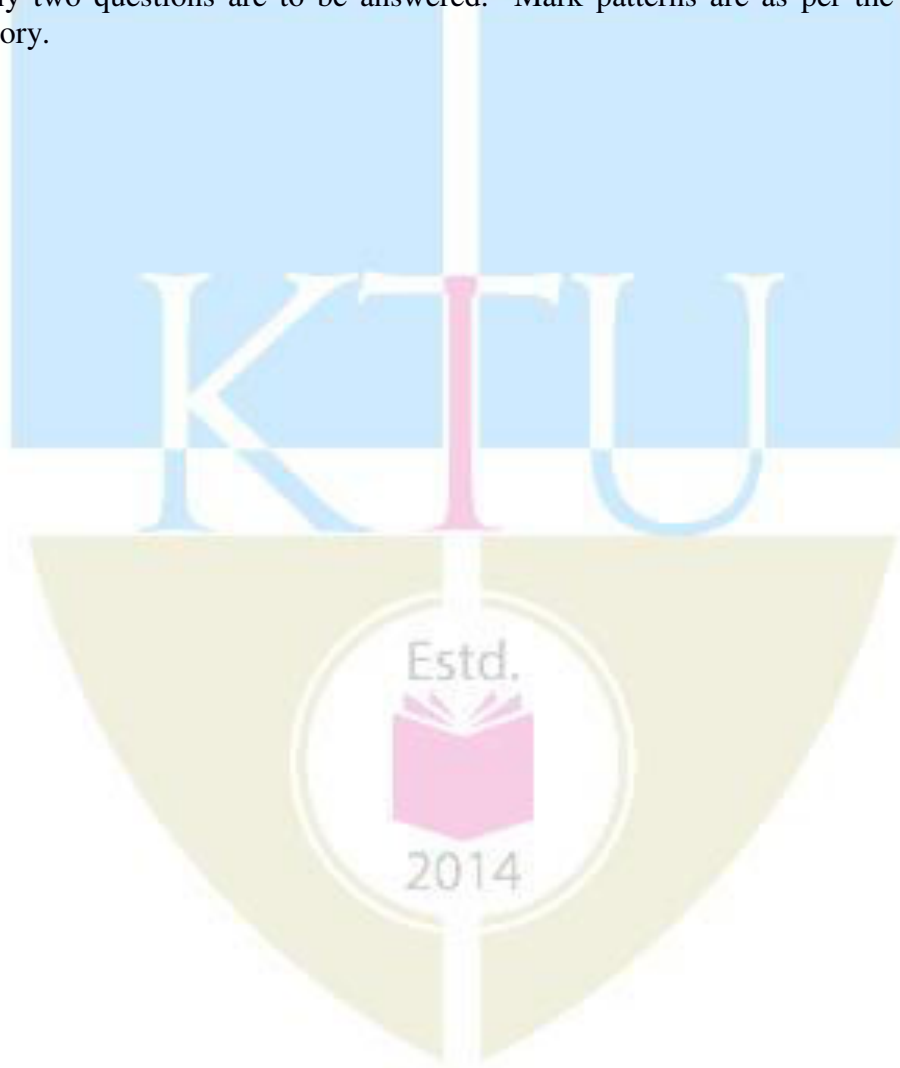
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>L-T-P-C</b>	<b>YEAR OF INTRODUCTION</b>
<b>EC482</b>	<b>Biomedical Engineering</b>	<b>3-0-0-3</b>	<b>2016</b>
<b>Prerequisite:</b> Nil			
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>• To introduce basics of biomedical engineering technology</li> <li>• To understand the anatomy &amp; physiology of major systems of the body in designing equipment for medical treatments.</li> <li>• To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.</li> </ul>			
<b>Syllabus:</b>			
Human body-overview, Physiological systems of body, Measurement of physiological parameters, Assisting and therapeutic devices, Medical laboratory equipments, Telemetry in patient care, Patient safety, Medical imaging system			
<b>Expected outcome:</b>			
The students will be able:			
<ol style="list-style-type: none"> <li>i. To understand diagnosis and therapy related equipments.</li> <li>ii. To understand the problem and identify the necessity of equipment for diagnosis and therapy.</li> <li>iii. To understand the importance of electronics engineering in medical field.</li> <li>iv. To understand the importance of telemetry in patient care</li> </ol>			
<b>Text Books:</b>			
<ol style="list-style-type: none"> <li>1. K S Kandpur, "Hand book of Biomedical instrumentation", Tata McGraw Hill 2nd e/d.</li> <li>2. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, Biomedical Instrumentation and Measurements, PHI, 2nd Edition, 2004</li> </ol>			
<b>References:</b>			
<ol style="list-style-type: none"> <li>1. Barbara Christe, Introduction to Biomedical Instrumentation, Cambridge University Press, 2008.</li> <li>2. J J Carr, "Introduction to Biomedical Equipment Technology", 4ed, Pearson Education</li> <li>3. John G Webster, "Medical Instrumentation application and design", 3ed, John Wiley</li> <li>4. Richard Aston, "Principle of Biomedical Instrumentation and Measurement", Merrill Education/Prentice Hall.</li> </ol>			
<b>Course Plan</b>			
<b>Module</b>	<b>Course content</b>	<b>Hours</b>	<b>End Sem. Exam Marks</b>
<b>I</b>	Introduction to bio-medical instrumentation system, overview of anatomy and physiological systems of the body.	1	<b>15%</b>
	Sources of bio-electric potential: Resting and action potential, propagation of action potentials. Bioelectric potentials examples (ECG, EEG, EMG, ERG, EOG, EGG, etc introduction only.)	2	

	Electrode theory: Nernst relation Bio potential electrodes: Microelectrodes, skin surface electrodes, needle electrodes.	1	
	Instrumentation for clinical laboratory: Bio potential amplifiers-instrumentation amplifiers, carrier amplifiers, isolation amplifiers, chopper amplifiers	2	
II	Heart and cardiovascular system (brief discussion), electro conduction system of the heart. Electrocardiography, ECG machine block diagram, ECG lead configurations, ECG recording system, Einthoven triangle, analysis of ECG signals.	3	15%
	Measurement of blood pressure: Direct, indirect and relative methods of blood pressure measurement, auscultatory method, oscillometric and ultrasonic non-invasive pressure measurements.	2	
	Measurement of blood flow: Electromagnetic blood flow meters and ultrasonic blood flow meters.	2	
<b>FIRST INTERNAL EXAM</b>			
III	The human nervous system. Neuron, action potential of brain, brain waves, types of electrodes, placement of electrodes, evoked potential, EEG recording, analysis of EEG.	2	15%
	Electromyography: Nerve conduction velocity, instrumentation system for EMG.	1	
	Physiology of respiratory system (brief discussion), Respiratory parameters, spirometer, body plethysmographs, gas exchange and distribution.	2	
	Instruments for clinical laboratory: Oxymeters, pH meter, blood cell counter, flame photometer, spectrophotometer	3	
IV	Therapeutic Equipments: Principle, block schematic diagram, working and applications of: pacemakers, cardiac defibrillators, heart-lung machine, dialyzers, surgical diathermy equipment, ventilators	6	15%
<b>SECOND INTERNAL EXAM</b>			
V	Medical Imaging systems (Basic Principle only): X-ray imaging - Properties and production of X-rays, X-ray machine, applications of X-rays in medicine.	2	20%
	Computed Tomography: Principle, image reconstruction, scanning system and applications.	2	
	Ultrasonic imaging systems: Basic pulse echo system, propagation of ultrasonic through tissues and reflections, display types, A-Scan, B-Scan, M-Scan, applications, real-time ultrasonic imaging systems and probes.	3	
VI	Magnetic Resonance Imaging – Basic NMR components, Biological effects and advantages of NMR imaging	3	20%

	Biomedical Telemetry system: Components of biotelemetry system, application of telemetry in medicine, single channel telemetry system for ECG and temperature	2	
	Patient Safety: Electric shock hazards, leakage current, safety codes for electro medical equipments	1	
<b>END SEMESTER EXAM</b>			

### Question Paper Pattern ( End semester exam)

The question paper shall consist of three parts. Part A covers modules I and II, Part B covers modules III and IV, and Part C covers modules V and VI. Each part has three questions uniformly covering the two modules and each question can have maximum four subdivisions. In each part, any two questions are to be answered. Mark patterns are as per the syllabus with 100% for theory.



Course code	Course Name	L-T-P - Credits	Year of Introduction
MP469	Industrial Psychology and Organisational Behaviour	3-0-0-3	2016
<b>Course Objectives</b> <ul style="list-style-type: none"> <li>To create a knowledge about human psychology</li> <li>To learn about theories of motivation and group behavior.</li> <li>To understand the socio-cultural aspects in organizations</li> </ul>			
<b>Syllabus</b> Introduction- psychology as a science- study of behaviour- stimulus- response behaviour- heredity and environment- human mind- cognition- character- thinking- attention- memory- emotion- traits- attitude- personality. Organizational behaviour- definition –development- fundamental concept- organizational behaviour system- models - understanding a social-system - managing communication- Motivation- motivation driver - goal setting- expectancy model- comparison models- interpreting motivational models- leadership- path goal model. Special topics in industrial psychology- managing group in organization- group and inter group dynamics- managing change and organizational development- nature planned change- resistance characteristics			
<b>Expected outcome.</b> The students will be able to <ol style="list-style-type: none"> <li>know the importance of psychology</li> <li>have insight into individual and group behavior</li> <li>deal with people in better way</li> <li>motivate groups and build teams.</li> </ol>			
<b>Text Book:</b> Davis K. & Newstrom J.W., <i>Human Behaviour at work</i> , Mcgraw Hill International, 1985			
<b>References:</b> <ol style="list-style-type: none"> <li>Blum M.L. Naylor J.C., Horper &amp; Row, <i>Industrial Psychology</i>, CBS Publisher, 1968</li> <li>Luthans, <i>Organizational Behaviour</i>, McGraw Hill, International, 1997</li> <li>Morgan C.t., King R.A., John Rweisz &amp; John Schoples, <i>Introduction to Psychology</i>, McHraw Hill, 1966</li> <li>Schermerhorn J.R.Jr., Hunt J.G &amp; Osborn R.N., <i>Managing, Organizational Behaviour</i>, John Willy</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	End Sem. Exam Marks
I	Introduction- psychology as a science- area of applications – study of individual- individual differences- study of behaviour- stimulus- response behaviour- heredity and environment- human mind- cognition- character- thinking- attention- memory- emotion- traits- attitude- personality	6	15%
II	Human mind- cognition- character- thinking- attention- memory- emotion- traits- attitude- personality	6	15%
<b>FIRST INTERNAL EXAMINATION</b>			
III	Organizational behaviour- definition –development- fundamental concept- nature of people nature of organization – an organizational behaviour system- models- autocratic model- hybrid model-	6	15%



<b>IV</b>	Understanding a social-system social culture- managing communication- downward, upward and other forms of communication	6	15%
<b>SECOND INTERNAL EXAMINATION</b>			
<b>V</b>	Motivation- motivation driver- human needs- behaviour modification- goal setting- expectancy model- comparison models- interpreting motivational models- leadership- path goal model- style – contingency approach	9	20%
<b>VI</b>	Special topics in industrial psychology- managing group in organization- group and inter group dynamics- managing change and organizational development- nature planned change- resistance characteristic of OD-OD process	9	20%
<b>END SEMESTER EXAM</b>			

### Question Paper Pattern

Maximum marks: 100

Time: 3 hrs

The question paper should consist of three parts

**Part A**

There should be 2 questions each from module I and II

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

**Part B**

There should be 2 questions each from module III and IV

Each question carries 10 marks

Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

**Part C**

There should be 3 questions each from module V and VI

Each question carries 10 marks

Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

**Note:** In all parts, each question can have a maximum of four sub questions