Dr D Y Patil School of Engineering Lohegaon, Pune

Dept. of Engineering Sciences (FE)

COURSE OUTCOMES (CO's)

Savitribai Phule Pune University		
First Year Engineering (2019 Course)		
107001 – Engineering Mathematics – I		
Teaching Scheme: **TH : 3 Hrs./Week** **TUT : 1 Hr/Week**	**Credits** **04**	**Examination Scheme:** **In-Semester Exam :30 Marks** **End-Semester Exam :70 Marks** **TW :25 Marks**
Prerequisites: Differentiation, Integration, Maxima and Minima, Determinants and Matrices.		
Course Objectives: To make the students familiarize with concepts and techniques in Calculus, Fourier series and Matrices. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.		
Course Outcomes (COs): The students will be able to learn **CO1**: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems. **CO2:** the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems. **CO3:** to deal withderivative of functions of several variables that are essential in various branches of Engineering. **CO4:** to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function. **CO5**: the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems		

107002: Engineering Physics		
Teaching Scheme: **TH: 04 Hr/week** **PR: 02 Hr/Week**	**Credits** **05**	**Examination Scheme:** **In-Semester :30 Marks** **End-Semester :70 Marks** **PR :25 Marks**
Prerequisite Courses, if any: Fundamentals of: optics, interference, diffraction polarization, wave-particle duality, semiconductors and magnetism		
Companion Course, if any: Laboratory Practical		
Course Objectives: To teach students basic concepts and principles of physics, relate them to laboratory experiments and their applications		
Course Outcomes: On completion of the course, learner will be able to– **CO1**: Develop understanding of interference, diffraction and polarization; connect it to few engineering applications. **CO2**: Learn basics of lasers and optical fibers and their use in some applications. **CO3**: Understand concepts and principles in quantum mechanics. Relate them to some applications. **CO4**: Understand theory of semiconductors and their applications in some semiconductor devices. **CO5**: Summarize basics of magnetism and superconductivity. Explore few of their technological applications. **CO6**: Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.		

102003 - Systems in Mechanical Engineering		
Teaching Scheme: **TH : 3 Hrs./week** **PR : 2 Hrs./Week**	**Credits** **04**	**Examination Scheme:** **In-Semester :30 Marks** **End-Semester :70 Marks** **PR :25 Marks**

Course Objectives:

1. To identify the sources of energy and their conversions
2. To explain the basic concept of engineering thermodynamics and its application
3. To understanding the specifications of vehicles
4. To get acquainted with vehicle systems
5. To introduce manufacturing processes applying proper method to produce components
6. To be able to select and compare domestic appliances

Course Outcomes

On completion of the course, learner will be able to

CO1: Describe and compare the conversion of energy from renewable and non-renewable energy sources

CO2: Explain basic laws of thermodynamics, heat transfer and their applications

CO3: List down the types of road vehicles and their specifications

CO4: Illustrate various basic parts and transmission system of a road vehicle

CO5: Discuss several manufacturing processes and identify the suitable process

CO6: Explain various types of mechanism and its application

103004: Basic Electrical Engineering

Teaching Scheme:	Credits	Examination Scheme:
TH : 03 Hr/week PR : 02 Hr/Week	04	In-Semester : 30 Marks End-Semester : 70 Marks PR : 25 Marks

Prerequisite Courses, if any: Engineering physics, electron theory, electricity, potential and kinetic energy

Course Overview: This course aims at enabling students of all Engineering Branches to understand the basic concepts of electrical engineering. This course is designed to provide knowledge of fundamentals and various laws in electromagnetic and magnetic circuits, electrostatics. The steady state analysis of AC and DC circuits, and its applications transformer, batteries and different energy conversion techniques are also included in this course.

Course Objectives:

1. To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2. To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3. To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4. To provide knowledge of the concepts of transformer, different energy conversions techniques.

Course Outcomes:

At the end of course students will be able to

CO1: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.

CO2: Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic

CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.

CO4: Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions

CO5: Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.

CO6: Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.

110005: Programming and Problem Solving

Teaching Scheme:	Credits	Examination Scheme:
TH: 03 Hrs/Week	04	In-Semester : 30 Marks
PR : 02 Hrs/Week		End-Semester : 70 Marks
		PR : 25 Marks

Prerequisite Courses, if any: students are expected to have a good understanding of basic computer principles.

Companion Course, if any: Programming and Problem Solving Laboratory (110005)

Course Objectives:

Prime objective is to give students a basic introduction to programming and problem solving with computer language Python. And to introduce students not merely to the coding of computer programs, but to computational thinking, the methodology of computer programming, and the principles of good program design including modularity and encapsulation.

1. To understand problem solving, problem solving aspects, programming and to know about various program design tools.
2. To learn problem solving with computers
3. To learn basics, features and future of Python programming.
4. To acquaint with data types, input output statements, decision making, looping and functions in Python
5. To learn features of Object Oriented Programming using Python
6. To acquaint with the use and benefits of files handling in Python

Following Fields are applicable for courses with companion Laboratory course

Course Outcomes: On completion of the course, learner will be able to–

CO1: Inculcate and apply various skills in problem solving.

CO2: Choose most appropriate programming constructs and features to solve the problems in diversified domains.

CO3: Exhibit the programming skills for the problems those require the writing of well-documented programs including use of the logical constructs of language, Python.

CO4: Demonstrate significant experience with the Python program development environment.

111006 -Workshop Practice

Teaching Scheme:	Credits	Examination Scheme:
PR : 2 Hrs/Week	01	PR : 25 Marks

Course Objectives:

1. To understand the construction and working of machine tools and functions of its parts.
2. To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop leading to understanding of a production processes.
3. To understand workshop layout and safety norms.

Course Outcomes:

CO1: Familiar with safety norms to prevent any mishap in workshop.

CO2: Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.

CO3: Able to understand the construction, working and functions of machine tools and their parts.

CO4: Able to know simple operations (Turning and Facing) on a centre lathe.

101007: Environmental Studies-I

TH:02 Hrs./week **(Mandatory Non-Credit Course)**

Course Objectives:

1. To explain the concepts and strategies related to sustainable development and various components of environment.
2. To examine biotic and abiotic factors within an ecosystem, to identify food chains, webs, as well as energy flow and relationships.
3. To identify and analyze various conservation methods and their effectiveness in relation to renewable and nonrenewable natural resources.
4. To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity on national and local scale.

Course Outcomes: On completion of the course, learner will be able to–

CO1:Demonstrate an integrative approach to environmental issues with a focus on sustainability.

CO2: Explain and identify the role of the organism in energy transfers in different ecosystems.

CO3: Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources.

CO4: Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings.

107008 – Engineering Mathematics – II		
Teaching Scheme: **TH : 4 Hrs./Week** **TUT : 1 Hr./Week**	**Credits** **05**	**Examination Scheme:** **In-Semester : 30 Marks** **End-Semester : 70 Marks** **TW : 25 Marks**

Prerequisites:

Integration, Differential Equation, Three-dimensional coordinate systems

Course Objectives:

To make the students familiarize with Mathematical Modeling of physical systems using differential equations advanced techniques of integration, tracing of curve, multiple integrals and their applications. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance thinking power, useful in their disciplines.

Course Outcomes (COs): The students will be able to learn

CO1: the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.

CO2: advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.

CO3: to trace the curve for a given equation and measure arc length of various curves.

CO4: the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.

CO5: evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.

107009: Engineering Chemistry

Teaching Scheme:	Credits	Examination Scheme:
TH : 04 Hrs/week	05	In Semester : 30 Marks
PR : 02 Hrs/Week		End Semester: 70 Marks
		PR : 25 Marks

Prerequisite Courses, if any:
Types of titrations, volumetric analysis, structure property relationship, types of crystals, periodic table, classification and properties of polymers, electromagnetic radiation, electrochemical series

Companion Course, if any: Laboratory Practical

Course Objectives:

1. To understand technology involved in analysis and improving quality of water as commodity.
2. To acquire the knowledge of electro-analytical techniques that facilitates rapid and precise understanding of materials.
3. To understand structure, properties and applications of speciality polymers and nano material.
4. To study conventional and alternative fuels with respect to their properties and applications.
5. To study spectroscopic techniques for chemical analysis.
6. To understand corrosion mechanisms and preventive methods for corrosion control.

Course Outcomes:
On completion of the course, learner will be able to–

CO1: Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.

CO2: Select appropriate electro-technique and method of material analysis.

CO3: Demonstrate the knowledge of advanced engineering materials for various engineering applications.

CO4: Analyze fuel and suggest use of alternative fuels.

CO5: Identify chemical compounds based on their structure.

CO6: Explain causes of corrosion and methods for minimizing corrosion.

104010:Basic Electronics Engineering

Teaching Scheme:	Credits	Examination Scheme
TH : 03 Hrs./week	04	In - Semester : 30 Marks
PR : 02 Hrs./week		End - Semester : 70 Marks
		PR : 25 Marks

Course Objectives:

1. The principle of electronics and working principle of PN junction diode and special purpose diodes.
2. The functioning of transistors like BJT, MOSFETs and OPAMP.
3. Basics of various logic gates, digital circuits and their applications.
4. Working and functions of various electronic instruments.
5. The operating principles and applications of various active and passive sensors.
6. Basic principles of communication systems.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Explain the working of P-N junction diode and its circuits.

CO2: Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET.

CO3: Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.

CO4: Use different electronics measuring instruments to measure various electrical parameters.

CO5: Select sensors for specific applications.

102012: Engineering Graphics

Teaching Scheme:	Credits	Examination Scheme:
TH : 01 Hr/week	02	End-Semester : 50 Marks
PR : 02 Hrs/Week		TW : 25 Marks
TUT : 01 Hr/Week		

Course Objectives

1. To acquire basic knowledge about engineering drawing language, line types, dimension methods, and simple geometrical construction.
2. To draw conic sections by various methods, involutes, cycloid and spiral.
3. To acquire basic knowledge about physical realization of engineering objects and shall be able to draw its different views.
4. To visualize three dimensional engineering objects and shall be able to draw their isometric views.
5. To imagine visualization of lateral development of solids.
6. To acquire basic knowledge about the various CAD drafting software's and its basic commands required to construct the simple engineering objects.

Course Outcomes

On completion of the course, learner will be able to

CO1: Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.

CO2: Construct the various engineering curves using the drawing instruments.

CO3: Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.

CO4: Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.

CO5: Draw the development of lateral surfaces for cut section of geometrical solids.

CO6: Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.

110013: Project Based Learning

Teaching Scheme:	Credits	Examination Scheme:
PR: 04 Hrs/Week	02	PR : 50 Marks

Preamble:

For better learning experience, along with traditional classroom teaching and laboratory learning; project based learning has been introduced with an objective to motivate students to learn by working in group cooperatively to solve a problem.

Project-based learning (PBL) is a student-centric pedagogy that involves a dynamic classroom approach in which it is believed that students acquire a deeper knowledge through active exploration of real-world challenges and problems. Students learn about a subject by working for an extended period of time to investigate and respond to a complex question, challenge, or problem. It is a style of active learning and inquiry-based learning. (Reference: Wikipedia). Problem based learning will also redefine the role of teacher as mentor in learning process. Along with communicating knowledge to students, often in a lecture setting, the teacher will also to act as an initiator and facilitator in the collaborative process of knowledge transfer and development.

Course Objectives:

1. To emphasizes learning activities that are long-term, interdisciplinary and student-centric.
2. To inculcate independent learning by problem solving with social context.
3. To engages students in rich and authentic learning experiences.
4. To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism

Course Outcomes:

CO1: Project based learning will increase their capacity and learning through shared cognition.
CO2: Students able to draw on lessons from several disciplines and apply them in practical way.
CO3: Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.

Group Structure:

Working in supervisor/mentor –monitored groups. The students plan, manage and complete a task/project/activity which addresses the stated problem.

- There should be team/group of 5 -6 students
- A supervisor/mentor teacher assigned to individual groups

101014: Environmental Studies-II

TH: 02 Hr/week **Mandatory Non-Credit Course**

Course Objectives:

1. To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control.
2. To understand the evolution of environmental policies and laws.
3. To explain the concepts behind the interrelations between environment and the development.
4. To examine a range of environmental issues in the field, and relate these to scientific theory.

Course Outcomes: On completion of the course, learner will be able to–

CO1: Have an understanding of environmental pollution and the science behind those problems and potential solutions.
CO2: Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.
CO3: Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.
CO4: Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.