



SCTR'S PUNE INSTITUTE OF COMPUTER TECHNOLOGY,
PUNE-43

Department of Basic Sciences and Engineering
(F. Y. B. Tech.)

COURSE OUTCOMES (COs)

F001: LINEAR ALGEBRA AND CALCULUS (LAC)	
The student shall be able to	
F001-1	Solve system of linear equations. Examine linear dependence of vectors. Express linear and orthogonal transformations in matrix form and discuss its nature.
F001-2	Find eigenvalues and eigenvectors which are useful in the study of diagonalization. Classify quadratic forms as definite, semi-definite and indefinite.
F001-3	Determine the partial derivatives of functions of several variables and discuss its applications
F001-4	Perform vector differentiation and analyze the vector fields.

F002: STATISTICS AND INTEGRAL CALCULUS (SIC)	
The student shall be able to	
F002-1	Explain statistical methods for data interpretation and data analysis. Test acceptance of hypothesis. Determine differences between research results using ANOVA.
F002-2	Discuss probability theory for analysis and prediction of a given data.
F002-3	Express periodic functions in terms of Fourier series which will be useful for design and analysis of continuous and discrete systems.
F002-4	Use advanced techniques for evaluating definite integrals. Evaluate multiple integrals in various coordinate systems and apply it to find area, volume, moment of inertia, Centre of gravity.

F003: QUANTUM PHYSICS (QP)	
The student shall be able to	
F003-1	Apply principles of lasers and optical fibers for transmission of data in fiber optic communication system.
F003-2	Discuss technological developments in magnetism and superconductors and their emerging applications.
F003-3	Associate superposition and quantum entanglement with quantum computing.
F003-4	Describe quantum confinement effect and its role in size-dependent properties at nanoscale and explain its applications in quantum information science.

F004: QUANTUM PHYSICS LAB (QPL)

The student shall be able to

F004-1	Apply the laws of diffraction to calculate the thickness of a wire/hair and the emission wavelengths of mercury.
F004-2	Calculate the numerical aperture and measure attenuation in optical fiber.
F004-3	Calculate the Plank's constant.
F004-4	Calculate the charge carrier concentration, mobility and energy band gap of a given semiconductor and analyze the I-V characteristics of a solar cell.

F005: CHEMICAL SCIENCE & TECHNOLOGY (CST)

On completion of the course, learner will be able to

F005-1	Analyze different types of conventional and non-conventional energy systems.
F005-2	Apply the appropriate modern analytical techniques.
F005-3	Demonstrate structure, properties, and applications of advanced materials.
F005-4	Analyze water softening parameters.

F006: CHEMICAL SCIENCE & TECHNOLOGY LAB (CSTL)

On completion of the course, learner will be able to

F006-1	Perform various experiments in a team, comparing the experimental results with the analytical values and drawing conclusions based on the evaluation with effective communication in team.
F006-2	Calibrate and operate the analytical instruments.
F006-3	Solve problems based on the application of various principles of chemistry individually and in team

F007: MECHANICS FOR ROBOTICS (MFR)

The student shall be able to

F-007-1	Determine the resultant of a given 2D force system and analyze the equilibrium of the frames under different loading conditions.
F007-2	Analyze the motion of a particle using equations of kinematics and apply Newton's second law of motion to solve problems of practical significance.
F007-3	Locate the position of Instantaneous Centre of Rotation (ICR) and determine the angular velocity of the member in each mechanism.
F007-4	Classify different types of robots, find out the degrees of freedom for a robotic system and explain the concept of Forward and Reverse kinematics.

F008: MECHANICS FOR ROBOTICS LAB (MFRL)

The students shall be able to

F008-1	Perform the experiments in a team, verify the results and draw conclusions based on the evaluation.
F008-2	Solve the problems based on the application of various principles of mechanics.
F008-3	Write an algorithm and a program in python for various engineering problems.

F009: INTEGRATED ELECTRICAL AND ELECTRONICS ENGINEERING (IEEE)

The students shall be able to

F009-1	Draw and Analyze AC & DC circuits.
F009-2	Solve the problems based on the working principle of DC & AC machines with its applications.
F009-3	Explain the construction, working principle and application of diodes, transistors.
F009-4	Compare number systems and explain the working of digital circuits using basic gates and flip flops.

F010: INTEGRATED ELECTRICAL AND ELECTRONICS ENGINEERING LAB (IEEEL)

The students shall be able to

F010-1	List the basic properties of electrical elements and solve DC circuit analysis problems. DC network theorems.
F010-2	Demonstrate the fundamental behavior of AC circuits and solve AC circuit problems.
F010-3	Analyze the basic characteristics of transformers and electrical machines.
F010-4	Implement analog and digital circuits. Verify their output (Output waveforms, Truth table, etc). Plot V-I characteristics of different Diodes.

F011: COMPUTER GRAPHICS AND DESIGN (CGD)

The student shall be able to

F011-1	Interpret and explain the key aspects of computer graphics, distinguishing between 2D drawing and 3D modeling methods.
F011-2	Examine different approaches to orthographic projection to evaluate their suitability for specific graphical representation tasks.
F011-3	Apply isometric projection techniques to create detailed and precise visual representations of machine components.
F011-4	Demonstrate the ability to comprehend and apply Geometric Dimensioning and Tolerances (GD&T).

F012: COMPUTER GRAPHICS AND DESIGN LAB (CGDL)

The student shall be able to

F012-1	Interpret and explain the key aspects of computer graphics, distinguishing between 2D drawing and 3D modeling methods.
F012-2	Examine different approaches to orthographic projection to evaluate their suitability for specific graphical representation tasks.
F012-3	Apply isometric projection techniques to create detailed and precise visual representations of machine components.
F012-4	Demonstrate the ability to comprehend and apply Geometric Dimensioning and Tolerances (GD&T).

F013: C PROGRAMMING FOR PROBLEM SOLVING (CPPS)

The student shall be able to

F013-1	Exhibit algorithmic thinking and being able to design, analyze, and implement algorithms to solve a wide range of computational problems.
F013-2	Implement algorithms and solutions using C language constructs.
F013-3	Write well-structured, efficient, C code using fundamental data structures such as arrays and structures.
F013-4	Design and develop programs in C to address real-world problems

F014: C PROGRAMMING FOR PROBLEM SOLVING LAB (CPPSL)

The student shall be able to

F014-1	Develop, Debug and Execute programs to demonstrate basic constructs in C.
F014-2	Develop a C program by using Decision making statements and branching.
F014-3	Implement a C program using arrays and structures.
F014-4	Design and develop C program using pointers and function.

F015: OBJECT ORIENTED PROGRAMMING USING C++ (OOPC)

The student shall be able to

F015-1	Apply object-oriented features of C++, including polymorphism and inheritance.
F015-2	Apply advanced features of C++, including operator overloading and memory management.
F015-3	Write efficient programs in C++ that adhere to good design principles.
F015-4	Design and develop programs in C++ to address real-world problems

F016: OBJECT ORIENTED PROGRAMMING USING C++ LAB (OOPCL)

The student shall be able to

F016-1	Implement a class using encapsulation, constructors, and destructor.
F016-2	Identify and implement relevant types of inheritance.
F016-3	Implement functions and polymorphism in C++ for given problem.
F016-4	Apply exception handling and use file handling in C++

F017: FAB LAB (FL)

The student shall be able to

F017-1	Demonstrate FAB Lab operations, including layout, safety protocols, and proficient usage of basic equipment and tools.
F017-2	Create 3D models using CAD software, 3D prints prototypes, and evaluate both design accuracy and print quality.
F017-3	Demonstrate a fundamental understanding of CNC programming, and execution of simple CNC programs for basic shapes.
F017-4	Describe the basic principles behind metal joining, metal cutting and forming, and woodworking techniques.

F018: INNOVATIVE IDEA AND DESIGN THINKING LAB (IIDTL)

The student shall be able to

F018-1	Demonstrate the ability to recognize opportunities within problems.
F018-2	Explain the processes involved in formulating product/service ideas.
F018-3	Analyze customer feedback to identify common themes and areas for improvement.
F018-4	Identify the role of design thinking & pitch their idea.

F019: ENVIRONMENT & SUSTAINABLE ENGINEERING (ESE)

The student shall be able to

F019-1	Describe the impact of ever-increasing human population on the biosphere with a focus on sustainability and Principles of Planning.
F019-2	Apply knowledge of environmental protection Acts in day-to-day life for sustainable development.
F019-3	Identify natural resources and apply knowledge to face any disaster.
F019-4	Apply knowledge of LCA (Life Cycle Assessment) for various products which are used in daily life and explore new technologies for alternative energy sources.

F020: INDIAN KNOWLEDGE SYSTEMS (IKS)

The student shall be able to

F020-1	Discuss the importance of Indian traditional knowledge with modern perspective.
F020-2	Explain ancient Indian Science & Technology
F020-3	Illustrate the Indian Arts and Architecture

F020-4	Recognize the holistic development towards life.
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F021: SOFT SKILLS (SS)	
The student shall be able to	
F021-1	Enhance their overall communication skills which would help them communicate effectively on the technical aspects, give proper and effective presentations, design reports and write business emails.
F021-2	Boost their confidence in public speaking, socializing with people & get understanding about work ethics, the corporate culture and developing people skills.
F021-3	Understand the nuances of non-verbal communication, which includes confident and positive body language, corporate grooming, the importance of teamwork , and the personality traits required to work productively in teams.
F021-4	Develop life skills and how these learnings would help them throughout their professional career and personal life. These sessions will make them inquisitive and will help them stay focused on life-long learning mode

F023 & F024: COCURRICULAR ACTIVITY-1 & 2 (CCA-1 & 2)	
The student shall be able to	
F023-1	Demonstrate the ability to lead and participate in teams.
F023-2	Develop several important life skills such as leadership, organization, confidence timemanagement, and socialization.
F023-3	Improve self-confidence and decision-making abilities.
F023-4	Experience the importance of community involvement.