

# Shivaji University, Kolhapur

**Name of Department: Department of Electronics**

**Name of Programme: M.Sc. Electronics**

Vision
We aspire to be a premier centre of higher education and research in Electronics
Mission
Educating our students and training them to excel in work and life
Program Outcomes
<ol style="list-style-type: none"><li><b>1. Domain Specific knowledge:</b> Apply the knowledge of mathematics, science, electronics to the solution of complex science &amp; engineering problems.</li><li><b>2. Problem analysis:</b> Identify, formulate, review research literature, and analyze complex science &amp; engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.</li><li><b>3. Design/development of solutions:</b> Design solutions for complex science &amp; engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.</li><li><b>4. Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.</li><li><b>5. Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex science &amp; engineering activities with an understanding of the limitations.</li><li><b>6. Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.</li><li><b>7. Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.</li><li><b>8. Communication:</b> Communicate effectively on complex science &amp; engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.</li><li><b>9. Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of</li></ol>

technological change.

10. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**Program Specific Outcomes**

1. **Professional Skills:** An ability to understand the basic concepts in and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.
2. **Problem-Solving Skills:** An ability to solve complex Electronics Science and Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.
3. **Successful Career and Entrepreneurship:** An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

**Course Outcomes**

**Part-I Semester-I**

CC-101	Measurements and Instrumentation	<ol style="list-style-type: none"><li>1. Ability to apply concepts of measurement and measurement system.</li><li>2. Ability to design and implement systems utilizing analog and/or digital control devices</li><li>3. Ability to apply the concepts of chemistry, physics, and electricity/electronics to motion and measurement.</li><li>4. Ability to apply the concepts of process measurements, sensor and transducer selection</li></ol>
CC-102	Foundations of Microwave Technology	<ol style="list-style-type: none"><li>1. The students will understand wave equations, equations in various media, reflection and refraction of em waves</li><li>2. They will be able to write the transmission line equations in various forms, solve transmission line problems, use Smith charts</li><li>3. They will be able to obtain field components of TE and TM waves for waveguides and cavity resonators. They will also learn principles of operation of various microwave passive components and their applications.</li></ol>

CC-103	Computer Organization	<ol style="list-style-type: none"> <li>1. To use an operating system such as DOS.</li> <li>2. To define computer components.</li> <li>3. To specify components for application specific computing system.</li> <li>4. To identify the basic components of a computing system to be used for a specific application</li> </ol>
CC-104	Advanced Digital Design	<ol style="list-style-type: none"> <li>1. Students become able to understand key ideas behind digital system design.</li> <li>2. Students become able to design CMOS based combinational and sequential circuit design necessary as a foundation of VLSI technology.</li> </ol>
Part-I Semester-II		
CC-201	Digital Communication	<ol style="list-style-type: none"> <li>1. Understand basic concept of digital communication system.</li> <li>2. Understand the real life applications.</li> <li>3. Understand why the prevailing systems are digital dominant.</li> </ol>
CC-202	Advanced Microwave Technology	<ol style="list-style-type: none"> <li>1. The students will be able to understand principles of operation of tube and semiconductor active microwave devices</li> <li>2. They will learn strips, fabrication technology of Hybrid MICs and various measurements at microwave frequencies</li> <li>3. They will also learn antennas at microwave frequencies, various radar systems and navigation systems</li> </ol>
CC-203	Advanced Power Electronics	<ol style="list-style-type: none"> <li>1. Students become able to understand basics key of Chopper Circuits.</li> <li>2. Students become able to Analyze Electrical circuits using Fourier and Laplace Transform techniques.</li> <li>3. Students become able to face industrial technical interviews successfully, those working on design and development of high power systems.</li> <li>4. Students would be able to understand different types of electrical machines.</li> </ol>
CC-204	Optoelectronics	<ol style="list-style-type: none"> <li>1. Ability to learn and identify the losses in</li> </ol>

		<p>optical fiber.</p> <ol style="list-style-type: none"> <li>2. Ability to acquires transmission characteristics, losses and preparation method.</li> <li>3. conversant with the application of optical properties in optical sources and detectors</li> <li>4. Ability to work out the operation of sources and detectors.</li> <li>5. Ability to train to solve computational problems and analyses the different measurements.</li> </ol>
Part-II Semester-III		
CC-301	Control Theory	<ol style="list-style-type: none"> <li>1. Understand various concepts related to control system</li> <li>2. Able to design and analyze control system</li> <li>3. Understand the importance of stability of control system</li> <li>4. Understand time and frequency response of control system</li> <li>5. Learn various types of controllers like P, PI, PD and PID</li> </ol>
CCS-302	Computer Networks	<ol style="list-style-type: none"> <li>1. Understand basic concept of computer networks.</li> <li>2. Understand network software &amp; network standardization.</li> <li>3. Understand the role of networking devices.</li> </ol>
CCS-303	Microcontroller System Design and ARM Architecture	<ol style="list-style-type: none"> <li>1. Demonstrate knowledge of the architecture of a modern microcontroller</li> <li>2. Understand the different architectures of microcontroller</li> <li>3. Able to programming the microcontroller</li> <li>4. Able to interface external devices to microcontroller</li> </ol>
DSE-304	Industrial Automation	<ol style="list-style-type: none"> <li>1. Able to identify the process model and analyze process dynamics</li> <li>2. Understand the performance of various control modes</li> <li>3. Able to program PLC for process control</li> <li>4. Understand SCADA</li> </ol>

DSE-304	Biomedical Instrumentation	<ol style="list-style-type: none"> <li>1. Demonstrate Differentiate different bio potentials and its propagations.</li> <li>2. Illustrate different electrode placement for various physiological recordings</li> <li>3. Design bio amplifier for various physiological recordings</li> <li>4. Explain various technique for non-electrical physiological measurements</li> <li>5. Demonstrate different biochemical measurement techniques.</li> </ol>
DSE-304	MATLAB Programming for Numerical Computation	<ol style="list-style-type: none"> <li>1. This course introduces students to MATLAB programming, and demonstrate its use for scientific computations.</li> <li>2. The basis of computational techniques are expounded through various coding examples and problems, and practical ways to use MATLAB will be discussed.</li> </ol>
DSE-304	Hardware-Software Co-design	<ol style="list-style-type: none"> <li>1. Able to write C programs.</li> <li>2. Able to define application specific storage requirements for the data and code.</li> <li>3. Able to write application programs in C for 8051 microcontroller.</li> </ol>
DSE-304	Satellite Communications	<ol style="list-style-type: none"> <li>1. The students will be able to understand various modulation, encoding and decoding techniques involved in satellite communications</li> <li>2. They will be able to understand various aspects of satellite channel and satellite transponder</li> <li>3. They will be able to understand various multiple access formats used in satellite communications</li> </ol>
DSE-304	Soft Computing	<ol style="list-style-type: none"> <li>1. Able to understand concepts related soft computing</li> <li>2. Understand the use of fuzzy systems</li> <li>3. Able to design and train neural network</li> </ol>
DSE-304	VHDL Programming	<ol style="list-style-type: none"> <li>1. Students get introduced with HDL programming languages.</li> <li>2. Students become able to write VHDL codes for various combinational and sequential</li> </ol>

		<p>designs.</p> <ol style="list-style-type: none"> <li>Students become able to understand basics of VLSI design with Concurrent Statements in VHDL.</li> <li>Students become able to understand basics of VLSI design with sequential Statements in VHDL.</li> </ol>
Part-II Semester-IV		
CC-401	Digital Signal Processing	<ol style="list-style-type: none"> <li>Understand Discrete Fourier Transform (DFT), its properties and applications</li> <li>Understand the use of Fast Fourier Transform (FFT) algorithm</li> <li>Able to design and analyse FIR and IIR digital filters</li> <li>Understand architecture of digital signal processor and applications of DSP</li> </ol>
CCS-402	Analog and Digital Circuit Design	<ol style="list-style-type: none"> <li>Able to design regulators and power supply</li> <li>Able to analyze and design Multivibrator and Oscillators</li> <li>Understand the analysis and design circuits using operational amplifiers</li> <li>Understand the design of digital circuits</li> </ol>
CCS-403	Real Time Embedded Systems	<ol style="list-style-type: none"> <li>To understand the application specific real time constraints.</li> <li>Design and develop real time embedded systems.</li> <li>To develop PIC microcontroller applications with emphasis on real time response.</li> <li>To employ RTOS components for real time designs.</li> </ol>
DSE-404	Advanced Drives	<ol style="list-style-type: none"> <li>Classify types of electric drives systems based on nature of loads, control objectives, performance and reliability.</li> <li>Combine concepts of previously learnt courses such as, electrical machines, Control and power electronics to cater to the need of automations in industries.</li> <li>Select most suitable type and specification of motor drive combination for efficient conversion and control of electric power.</li> </ol>

		4. Set up control strategies to synthesize the voltages in dc and ac motor drives.
DSE-404	Artificial Intelligence and Machine Learning	<ol style="list-style-type: none"> <li>1. Apply problem solving by intelligent search approach.</li> <li>2. Represent knowledge using AI knowledge representation techniques.</li> <li>3. Design Machine Learning solution to real life problems.</li> </ol>
DSE-404	IoT and Data Analytics	<ol style="list-style-type: none"> <li>1. Participants who complete the IOT Fundamentals: Big Data &amp; Analytics course will be able to perform the following functions: Describe the various systems that support a typical data center</li> <li>2. Explain how server virtualization consolidates idle resources, reduces cost and provide better services to the business</li> <li>3. Explain how the Software Defined Networking (SDN) framework plays the key role in data center virtualization</li> <li>4. Understand the steps of the Data Analysis Lifecycle and apply it in real life</li> </ol>
DSE-404	ARM Programming and Embedded Communication Protocols	<ol style="list-style-type: none"> <li>1. To write programs for ARM architectures.</li> <li>2. To write programs for communication between microcontrollers, or microcontroller and smart interfaces using I2C, SPI and CAN protocols.</li> </ol>
DSE-404	FPGA Based Systems	<ol style="list-style-type: none"> <li>1. Students become able to understand FPGA Design Flow for system design.</li> <li>2. Students become able to Compare FPGA and other Reconfigurable Devices.</li> <li>3. Students become able to understand VLSI design Technology.</li> <li>4. Students become able to design and test the FPGA based system</li> </ol>
DSE-404	Antennas	<ol style="list-style-type: none"> <li>1. Students will review basic antenna concepts, understand auxiliary potential functions, linear wire antennas</li> <li>2. They will be able to understand point sources-their arrays, pattern multiplication</li> <li>3. They will also be able to understand loop,</li> </ol>

		traveling wave and broad band antennas
DSE-404	Mechatronics	<ol style="list-style-type: none"> <li>1. Ability to learn and identify the Mechatronics</li> <li>2. Ability to acquires signal conditioning and pneumatics for Mechatronics</li> <li>3. Ability to understand responses, i/o systems and loops.</li> <li>4. Ability to train to gross up the knowledge and analyses robotics systems.</li> </ol>
DSE-404	Cellular Mobile Communications	<ol style="list-style-type: none"> <li>1. Ability to learn and identify the mobile communication system.</li> <li>2. Ability to acquires transceiver characteristics in mobile communication system</li> <li>3. Ability to work out the operation of digital systems.</li> <li>4. Ability to train to solve computational problems and analyses for mobile communication.</li> </ol>