Karnataka State Akkamahadevi Women's University

Vijayapura

Department of Electronics

M.Sc. Electronics

Program Outcomes, Program Specific Outcomes and Course Outcomes

Department of Electronics

M. Sc. Electronics: Program Outcomes		
PO1	Knowledge	Capable of demonstrating comprehensive knowledge in Electronics gained during course of study
PO2	Research-related Skills	Capability to ask relevant/appropriate questions for identifying, formulating and analyzing the research problems and to draw conclusion from the analysis
PO3	Communication Skills	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PO4	Problem Analysis	Analyze the problem, identify and formulate the computing requirements appropriate to solve real time problems
PO5	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member or leader in diverse teams, in multidisciplinary environment.
PO6	Scientific reasoning	Ability of critical thinking, analytical reasoning and research based knowledge including design of experiments, analysis and interpretation of data to provide conclusions.
PO7	Modern tool usage	Ability to use and learn techniques, skills and modern tools for scientific practices
PO8	Science and Society	Professionally trained to apply reasoning to assess the different issues related to society and the consequent responsibilities relevant to the professional scientific practices
PO9	Environment and Sustainability	Possess an adequate knowledge required for sustainable development keeping in view of environmental impacts and contemporary issues.
PO10	Life-Long Learning	Aptitude to apply both analytical and computational knowledge and skills, that are necessary for participating in learning activities throughout life

M. Sc. Electronics: Program Specific Outcomes	
PSO1	Acquire the knowledge in Electronic Devices and Circuits, Analog & Digital communication, Embedded systems, MEMS and other core areas of Electronics.
PSO2	Understand the principles and working of both hardware and software aspects of Electronic systems
PSO3	Gain theoretical and practical knowledge in developing areas of Electronics.
PSO4	To analyze, design and implement analog and digital electronic systems, information and communication systems.
PSO5	Assess the impact of new technologies and solve complex problems.
PSO6	Develop research oriented skills and to inculcate laboratory skills in students so that they can take up independent projects.

Mapping of Courses with Programmme Outcomes(POs)										
Courses		**Programmme Outcomes**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
I Semester											
ELH-1.1		✓	✓		✓		✓		✓		✓
ELH-1.2		✓	✓	✓	✓	✓		✓			✓
ELH-1.3		✓	✓					✓			
ELP-1.4		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELP-1.5		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELS-1.6	**(a)**	✓			✓						
	(b)	✓				✓					
	(c)	✓	✓		✓		✓				✓
ELO-1.7		✓				✓	✓				
II Semester											
ELH-2.1		✓	✓		✓	✓	✓	✓		✓	✓
ELH-2.2		✓	✓		✓	✓	✓	✓	✓	✓	✓
ELH-2.3		✓	✓			✓	✓		✓	✓	✓
ELP-2.4		✓	✓	✓	✓	✓	✓	✓		✓	✓
ELP-2.5		✓	✓		✓	✓			✓	✓	✓
ELS-2.6	**(a)**	✓	✓			✓	✓		✓		
	(b)	✓	✓		✓	✓	✓	✓		✓	✓
	(c)	✓	✓								
ELO-2.7		✓			✓	✓					✓
III Semester											
ELH-3.1		✓	✓		✓	✓		✓	✓	✓	✓
ELH-3.2		✓	✓		✓	✓	✓		✓	✓	✓
ELH-3.3		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELP-3.4		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELS-3.5	**(a)**	✓	✓		✓	✓		✓	✓	✓	✓
	(b)	✓	✓		✓	✓				✓	✓
	(c)	✓	✓	✓	✓	✓		✓		✓	✓
ELO-3.6		✓				✓					
IV Semester											
ELH-4.1		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELH-4.2		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ELS-4.3	**(a)**	✓				✓			✓		
	(b)	✓	✓					✓	✓	✓	✓
	(c)	✓			✓						
ELO-4.4		✓				✓			✓		✓

Course Objectives and Learning Outcomes: M. Sc Electronics

Semester I			
Course Code	**Course Title**	**Course Objectives**	**Course Learning Outcomes**
ELH-1.1	Solid State Semiconductor Devices	To enable the students to understand about the crystal structure and properties, formation of bands in semiconductors, charge carrier concentration and transport phenomenon and fabrication of p-n junctions and to study various semiconductor devices	CO1: Learn the basic knowledge and concepts of Semiconductor materials and devices. CO2: Understand the various crystal properties, crystal growth processes. CO3: Gain insight into the charge carrier concentrations and carrier transport phenomena. CO4: Understand the fabrication process of p-n junctions and the associated phenomenon. CO5: Study the construction, operation and characteristics of semiconductor devices.
ELH-1.2	Programming in C++	To understand the various concepts of object oriented programming and to enable students to apply programming skill to solve real world problems.	CO1: Learn the basics of programming language CO2: Understand the concepts of tokens, decision making statements and functions. CO3: To learn object oriented programming language CO4: Study about templates. CO5: To handle abnormal termination of a program using exception handling CO6: Gain insight into the STL
ELH-1.3	Digital Electronics and Verilog HDL	To understand the digital circuits and to develop the skills to model a digital system using Verilog HDL	CO1: Review of Boolean algebra and simplification techniques CO2: Study the combinational and sequential logic circuits. CO3: Learn a hardware description language that can be used to model a digital system

			CO4: Understand the level of abstraction ranging from the behavioral level to gate level
ELP-1.4	C++Programming lab	Understand the programming constructs to write C++ programs	CO1: Write programs to solve real world problems.
ELP-1.5	Digital Electronics and Verilog HDL Lab	Focus on hardware and software techniques of designing and implementing various digital systems.	CO1: Design and implement various digital circuits CO2: Gain insight into hardware and software techniques. CO3: To write programs to implement digital circuits.
ELS-1.6	a) Analog Devices and Circuits	To empower students to understand the design and working of diodes, BJT / FET and Operational Amplifier.	CO1: Understand the construction, operating principle, characteristics and applications of pn junction diodes and zener diode CO2: Study the construction and operation of BJT and compute different parameters for characterizing different circuits CO3: Analyze the performance of CE, CB and CC modes of transistor and design biasing circuits CO4: Learn the construction, working, characteristics and types of FET. Classify different types of FETs and demonstrate feedback amplifiers, OP-AMPs, and oscillator circuits. CO5: Understand the characteristics and parameters of op-amp. CO6: Study the op-amp configurations and applications.
	b) Signals and Systems	The concepts and theories of signals and systems form the foundation for further studies in areas	CO1: To understand mathematical description and representation of both continuous-time and discrete-

		such as analog and digital communication, analog and digital signal processing, control systems and circuit analysis and synthesis	time signals and systems and their properties. CO2: Study about Linear-Time Invariant systems. CO3: Learn about the concept of frequency domain representations and how to decompose periodic signals into their frequency components CO4: Analyze a signal using Fourier series and Fourier transform.
	c) Network Analysis	To equip the students with rigorous theoretical and practical knowledge to analyze and synthesize networks.	CO1: Apply the knowledge of basic circuital law and simplify the network using reduction technique. CO2: Analyze the circuit using Kirchoff's law and network theorem. CO3: Infer and evaluate transient response, steady state response, network functions.
ELO-1.7	Concepts of Electronics	To make the students focus on the basic concepts of electronic devices and circuits and to introduce the basic functional elements of instrumentation and the fundamentals of electronic instruments.	CO1: Understand the basic electronic components and circuits. CO2: Understand operation of diodes, transistors in order to design basic circuits CO3: Learn about integrated circuits and basic fabrication process. CO4: Study the basics of electronic instrumentation. CO5: Understand the application of the electronic systems in biological and medical applications.

Semester II			
Course Code	**Course Tilte**	**Course Objectives**	**Course Learning Outcomes**
ELH-2.1	8086 Architecture, Programming and Interfacing	To understand the architecture, programming of 8086 microprocessor, interfacing an external device with the processors.	CO1: Understand the 8086 architecture and addressing modes CO2: Learn to program 8086 microprocessor CO3: To understand various interrupts and hardware features of 8086 CO4: Gain insight about interfacing and coprocessors.
ELH-2.2	Electronic Instrumentation and Microcontrollers	To understand the concepts of measurement, transducer and data acquisition systems. Gain insight about microcontrollers and study PIC16F887 microcontroller	CO1: Study about basic concepts of measurement. CO2: Understand various transducers and data acquisition systems. CO3: Gain knowledge about biomedical instrumentation CO4: Learn PIC16F887 microcontroller
ELH-2.3	Electronic Communication	To acquire knowledge about analog communication systems.	CO1: Describe basic components of communication system and concept of modulation. CO2: Understand different modulation techniques. CO3: Learn about optical fiber communication. CO4: Understand the concepts and applications of Satellite communication system.
ELP-2.4	8086 Programming and Interfacing with PIC Microcontroller Lab	To understand the assembly language programming and interfacing experiments using PIC Microcontroller.	CO1: Student will be able to write assembly language programs. CO2: Learn to interface various devices using PIC Microcontroller.

ELP-2.5	Electronic Communication Lab	To gain practical knowledge through laboratory experiments.	CO1: Construct and study various modulation techniques. CO2: Construct and study about active filters. CO3: Analyze various analog modulation and demodulation schemes in time and frequency domains using communication kits
ELS-2.6	a) Computer Networks	Acquire knowledge of computer networking and enumerate the layers of OSI model and TCP/IP model	CO1: Learn the basics of computer networking CO2: Understand the functions of each layer in OSI and TCP/IP model. CO3: Describe the functions of data link layer and explain the protocols. CO4: Study about the routing protocols and IP addresses for the given network.
	b) Power Electronics and Circuits	To understand the theory of power semiconductor devices, their principle of operation, design and synthesis in different power electronic circuits.	CO1: Learn about basic power semiconductor devices CO2: Design and analyze Phase controlled rectifiers and power converter circuits CO3: Design and understand AC voltage controller, Cycloconverter and chopper circuits
	c) Multimedia Communications	To understand the multimedia communications systems, application and basic principles.	CO1: Describe characteristics of multimedia communication system CO2: Analyze multimedia compression techniques and streaming
ELO-2.7	Fundamentals of Digital Electronics	To acquire the basic knowledge of digital logic levels in order to	CO1: Review of number systems and binary arithmetic operations.

		understand digital electronics circuits.	CO2: Review of Boolean algebra and simplification techniques. CO3: Study the combinational logic circuits. CO4: Understand the design and working of sequential logic circuits.

Semester III			
Course Code	**Course Tilte**	**Course Objectives**	**Course Learning Outcomes**
ELH-3.1	Digital Signal Processing	To acquire knowledge design, implementation and analysis of DSP systems.	CO1: Learn about the basic concepts of signals and systems. CO2: Understand frequency domain analysis of discrete time signals. CO3: Design, implementation, analysis and comparison of digital filters for processing of discrete time signals CO4: Consider practical implementation issues in designing DSP systems.
ELH-3.2	Advanced Digital Communication	To acquire knowledge about digital communication systems, data coding, multiplexing and multiple access techniques.	CO1: Understand the building blocks of digital communication system CO2: Implement optimization techniques, data coding, channel requirements, signal to noise ratio, bandwidth, error finding within the received information and information theory CO3:Study the concept of multiplexing to fulfil the demand of high speed digital transmission CO4: Gain insight into wireless communication

			systems.
ELH-3.3	Control Engineering	To develop an understanding of the fundamentals of control theory, time and frequency response analysis and the concept of stability.	CO1: State open and closed loop control systems and their mathematical models. CO2: Understand the time response and frequency domain analysis of control systems. CO3: Gain insight about the stability analysis in terms of root-locus technique and bode plots.
ELP-3.4	Digital Signal Processing and Digital Communication Lab	To gain practical knowledge through laboratory experiments.	CO1: Classify discrete time signals/systems. CO2: Determine the convolution of discrete time signals using graphical and analytical methods. CO3: Apply Z-transform and Fourier transform for different type of signals and systems. CO4: Compute DFT/IDFT for discrete time signals and find circular convolution CO5: Develop FFT algorithms and design of analog/digital filters CO6: Compute the frequency response of digital filters CO7: Construct and study various digital modulation techniques.
ELS-3.5	a) Microwave Electronics	To enable students to gain knowledge of microwave technology essential for developing the systems for mobile communication, satellite and spacecraft communication, RADAR	CO1: Understand the laws of electrostatics and magnetostatics. CO2: Understand the basic concepts of microwaves and propagation through the transmission lines,

		etc.	microwave components CO3: Understand the working of microwave active circuits and study of various microwave semiconductor devices. CO4: Learn about the generation of microwaves through the vacuum-based tubes
	b) Image Processing	To learn image processing techniques focusing on theory and algorithms underlying a range of tasks including acquisition and formation, enhancement, segmentation and representation	CO1: Study the image fundamentals and mathematical transforms necessary for image processing CO2: Describe the basic concepts of signal acquisition, sampling and quantization. CO3: Understand the Fourier Transform concepts and special/frequency domain filtering using image enhancement algorithm. CO4: Understand the concepts of colour image processing and image restoration. CO5: Describe different morphological 'image-transformations' and the effects of morphological algorithm operations on images. CO6: Interpret image segmentation and representation techniques.
	c) ARM Processors and Real-Time Operating	To gain knowledge regarding design and analysis pertaining to design of an Embedded	CO1: Study about current technologies, integration methods and hardware and software design concepts of

	Systems	System using ARM Processors.	embedded systems. CO2: Understand the fundamentals and instruction set of ARM Processors CO3: Learn thumb instruction set and programming CO4: Learn the fundamentals of operating systems and their importance in real time applications CO5: Describe how a real-time operating system designed and their importance in embedded system design
ELO-3.6	Introduction to Microprocessors	To gain knowledge about microprocessor, programming microprocessor and to learn the basics of microcontrollers.	CO1. Understand the architecture and programming model of 8085 microprocessor. CO2. Able to write simple programs on Programming of 8085 microprocessor CO3. Learn about the basics of microcontroller.. CO4. Understand the Interfacing of Arduino microcontroller for various applications.

Semester IV			
Course Code	**Course Tilte**	**Course Objectives**	**Course Learning Outcomes**
ELH-4.1	Embedded Systems	To study about current technologies, integration methods and hardware and software design concepts associated with Embedded Systems.	CO1: Understand the hardware considerations in the design of embedded systems. CO2: Know about the fundamentals of operating systems and their importance in real time applications CO3: Describe how a real-time operating system

			designed and their importance in embedded system design.
ELH-4.2	Project Work	To provide the best possible training in learning to apply classroom knowledge to real experiments and allow further development of the creative process that is necessary to being a researcher.	CO1: Understand the importance of experimental and theoretical analysis. CO2: Design and develop embedded systems for real-time applications. CO3: Learn to write scientific papers.
ELS-4.3	a) Introduction to VLSI Circuits	To understand the theories and techniques of digital VLSI design in MOS and CMOS technology	CO1: Implement the logic circuits using MOS and CMOS technology. CO2: Acquire the knowledge about various CMOS fabrication process and its modeling. CO3: Analyse various circuit configurations and their applications.
	b) MEMS and Microsystems Technology	To gain basic knowledge on overview of MEMS (Micro Electro Mechanical System) and Microsystems Technology.	CO1: Understand the overview of MEMS and Microsystems CO2: Understand the fundamental properties of materials used for MEMS devices CO3: Gain a comprehensive perspective of various physical mechanisms for MEMS design CO4: Understand the fundamental principle of piezoresistive sensing, piezoelectric sensing, magnetostatic actuation and methods for fabricating
	c) Wavelet	To understand the basics of	CO1: Understand wavelet

	Transforms	wavelet theory and to illustrate the use of wavelet processing for data compression and noise suppression.	basis and characterize continuous and discrete wavelet transforms CO2: Understand MRA, orthonormal wavelets and their relationship to filter banks CO3: Implement discrete wavelet transforms with multirate digital filters CO4: Design certain classes of wavelets to specification and justify the basis of the application of wavelet transforms to different fields CO5: Understand the concepts of data compression and noise suppression
ELO-4.4	Basics of Communication Technology	To acquire knowledge about analog and digital communication systems and to understand about cellular wireless networks.	CO1: Describe basic components of communication system and concept of modulation. CO2: Understand different modulation techniques. CO3: Implement optimization techniques, data coding, channel requirements, signal to noise. ratio, bandwidth, error finding within the received information and information theory. CO4: Understand the concepts and applications of Satellite communication system. CO5: Learn about optical fiber communication. CO6: Gain insight into wireless communication systems.