Y&M AKI'S POONA COLLEGE OF ARTS, SCIENCE AND COMMERCE CAMP, PUNE-411001

DEPARTMENT OF ELECTRONIC SCIENCE

Department of Electronic Science is running two programs namely

1) **B.Sc. Electronic Science**
2) **M.Sc. Electronic Science**

Program Outcome

B. Sc. Degree:

At the graduation in science faculty a student should have: Acquired the knowledge with facts and figures related to various subjects in pure sciences such as Physics, Electronics, Chemistry, Botany, Zoology, Mathematics, etc. Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life. Acquired the skills in handling scientific instruments such as cathode ray oscilloscope, signal generator, Digital Multimeter etc, planning and performing in laboratory experiments The skills of observations and drawing logical inferences from the scientific experiments. Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions. Been able to think creatively (divergently and convergent) to propose novel ideas in explaining facts and figures or providing new solution to the problems. Realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments. Developed scientific outlook not only with respect to science subjects but also in all aspects related to life. Realized that knowledge of subjects in other faculties such as humanities, performing arts, social sciences etc. can have greatly and effectively influence which inspires in evolving new scientific theories and inventions. Imbibed ethical, moral and social values in personal and social life leading to highly cultured and civilized personality. Developed various communication skills such as reading,

listening, speaking, etc., which we will help in expressing ideas and views clearly and effectively. Realized that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life. Developed flair by participating in various social and cultural activities voluntarily, in order to spread knowledge, creating awareness about the social evils, blind faith, etc.

M. Sc. Degree:

General competence

- Ability to apply knowledge and abilities in practical activities with regards to relevant scientific professional and social judgements and viewpoints.
- Ability to successfully carry out advanced tasks and projects, both independently and in collaboration with others, as well as cross disciplines.
- Ability to approach problem solving in an interdisciplinary way.
- To combine insights from several scientific disciplines.
- To make critical and independent assessments of methods and results.
- To continuously develop their professional competence.
- Ability to gather, assess, communicate and make use of new information.
- Ability to evaluate responsibility and ethical viewpoints, which may arise in connection with different technical, organisational, economical, ecological and social activities.

Knowledge

- Broad knowledge on sustainable systems, conventional and renewable energy sources and conversion, as well as technical, economical, and environmentally-related consequences for different energy systems.
- In depth knowledge within the technical area of the chosen study track: bioenergy, energy systems, geothermal energy, heat and power engineering, solar cell systems and materials or system integration of wind power. Including knowledge in mathematics and natural sciences.
- Insight of contemporary research within various fields of energy systems.
- Research experience within a specific field of energy systems, through a supervised project (the master thesis)
- Knowledge of relevant methods and hypothesis testing and other tools used to analyse and solve energy system issues in research, manufacturing and management.
- Knowledge of international research in their specialty, knowledge ofinternational research groups in the field, and the breadth of research being done in the fields of: energy engineering.

Skills

- Show a good ability to analyse, formulate, and handle technical problems from a system perspective, with an overview on their life-cycle, from idea/need to specification, development, maintenance and termination, and the ability to set conditions, decide necessary resource consumption and manage processes for problem solving and realisation.
- Demonstrate competence in analysis, design, development and operation of energy systems within their study track: bioenergy, energy systems, geothermal energy, heat and power engineering, solar cell systems and materials or system integration of wind power.
- Demonstrate a broad, scientific foundation for work within the energy engineering area, and a good understanding of the complexity of energy systems.
- Possess individual and professional skills like languages, leadership, project management, and communication for work as an engineer in a leadership role or as a leader in a technical intensive company, or in order to be able to continue toward a research career.

Program Specific Outcome

Sr. No	Name of Program	Program Specific Outcome
1	**B.Sc. Electronic Science**	• To provide in depth knowledge of scientific and technological aspects of electronics • To familiarize with current and recent technological developments • To enrich knowledge through programmes such as industrial visits, hobby projects, market survey, projects etc. • To train students in skills related to electronics industry and market. • To create foundation for research and development in Electronics • To develop analytical abilities towards real world problems • To help students build-up a progressive and successful career in Electronics • To equip student with necessary fundamental concepts and knowledge base. • To develop specific practical skills.

		• To impart training on circuit design, analysis , building and testing. • To prepare students for demonstrating the acquired knowledge. • To encourage student to develop skills for accepting challenges of upcoming technological advancements.
2	**M.Sc. Electronic Science**	• Master of Science (M.Sc.) in Electronic science is a post graduation course of University of Pune. • The credit system to be implemented through this curriculum, would allow students to develop a strong footing in the fundamentals and specialize in the disciplines of his/her liking and abilities. • The students pursuing this course would have to develop in depth understanding various aspects of the subject. • The working principles, design guidelines and experimental skills associated with different semiconductor devices and circuits, underlying mathematical and analysis techniques, electromagnetic and instrumentation principles, design methodologies for digital and embedded systems, communication electronics and control systems and various applications of electronic devices, circuits and systems are among such important aspects.

M.Sc. Electronic Science additional specific outcome:

The M.Sc. program which follows the B.Sc. Electronics aims at training the students in the area of Semiconductor Electronics, Digital and Analog Electronics, DSP, Material Science and IC Technology. The students also have undergone courses in computer oriented numerical techniques and computer aided analysis of electronic networks. The objective of this course is to produce professionals for the industrial needs. Keeping this in mind the students are required to undergo two months summer training and a comprehensive six months project work.

The course is designed with a view to catering to the present day requirements in Industries, R&D fields, higher studies and Self-employment. Moreover the course structure

intends to inculcate strong laboratory skills so that the student can take up independent projects which will help to be an entrepreneur. The students passed out from the revised course will serve as quality human resource to take up the state of art research work of the Department. This course provides exposure to the students to the technologies in-vogue and trains them to take up projects relevant to the industrial needs, the R& D activities and self employment opportunities.

In addition the course caters to the requirements of providing complete exposure to NET/SET syllabus for Electronics farmed by the U.G.C.

B. Sc. Course Outcome

Sr. No	CLASS	Name of Course	Course outcome
1	**F.Y.B.Sc.**	**EL-101: Principles of Analog Electronics**	1. To get familiar with basic circuit elements and passive components 2. To understand DC circuit theorems and their use in circuit analysis 3. To study characteristic features of semiconductor devices 4. To study elementary electronic circuits and applications 5. To understand basics of operational amplifiers.
		EL-102: Principles of Digital Electronics	1. To get familiar with concepts of digital electronics 2. To learn number systems and their representation 3. To understand basic logic gates, boolean algebra and k-maps 4. To study arithmetic circuits, combinational circuits and sequential circuits 5. To study comparative aspects of logic families.
		EL-103: Practical	1. To get familiar with electronic

		Course	components and Instruments. 2. To learn the measurements of various parameters such as AC-DC voltages, AC-DC currents etc. 3. Testing of Diodes & Transistors by using multimeter.

2	**S.Y.B.Sc. SEM-I**	**Paper-I : Analog Circuit Design (EL211)**	1. To study basic principles of amplifiers and oscillators. 2. To understand the working of various analog circuits. 3. To develop analog circuit design skills. 4. To apply the knowledge of analog circuits in different applications.
		Paper-II: Digital Circuit Design (EL212)	1. To utilize k-maps in the design of combinational circuits. 2. To understand the design principles of sequential circuits. 3. To study the design and working of various data converters 4. To configure the digital circuits in system interfacing and applications.
	S.Y.B.Sc. SEM-II	**Paper-I: Electronic Instrumentation (EL221)**	1. To study the block diagram of electronic instruments 2. To understand the working principles of frequently used instruments. 3. To know important technical specifications of an instruments. 4. To learn the operating procedure of instruments.
		Paper-II: Communication Electronics (EL222)	1. To study basics of communication systems and telephone system. 2. To understand Amplitude and Frequency Modulation. 3. To understand basics of AM and FM Receivers. 4. To study the digital communication system.
	SEM-I & SEM-II	**Paper- III: Practical Course (EL 203)**	1. To make use of basic concepts for building different electronic circuits.. 2. To understand design procedures of different electronic circuit as per requirement

			3. To build experimental setup and test the circuits. 4. To develop skills of analyzing test results of given experiments .

3	**T.Y.B.Sc. SEM-III**	**Paper I: EL 331: Advanced Digital System Design**	1. To learn Basic design loop, design flow for logic circuits, Mealy & Moore sequential machine models 2. To use instruction set HDL's, features of Verilog HDL
		Paper II: EL-332: Microcontrollers	1. To learn architecture of 8-bit microcontroller. 2. To use instruction set and addressing modes of microcontroller. 3. To develop assembly language programming skills. 4. To interface memory and I/O devices.
		Paper III: EL-333 Analog Circuit Design and Applications of Linear ICs	1. To study the practical design aspects while using Opamps 2. To study the basic application circuits of Opamps 3. To Learn the specifications and selection criterion for linear ICs 4. To obtain information about different special purpose ICs and their applications 5. To refer and understand data manuals.
		Paper IV: EL-334: Principles of Semiconductor Devices	1. To introduce crystal structure with reference to semiconductors 2. To study the theory of metal-semiconductor and p-n junctions 3. To understand the characteristics of semiconductor devices 4. To introduce theoretical background of BJT and FETs
		Paper V: EL -335: 'C' Programming	1. To understand fundamentals of C language. 2. To develop algorithm/flowcharts for problem solving and writing programs. 3. To learn to use functions, arrays, pointers and file handling in C language. 4. To study different types of algorithm.
		Paper VI: EL-336: A) Fiber Optic Communication	1. To understand the principles of fiber optic communication system. 2. To learn measure different parameter of optical fibers. 3. To understand essential optical components of Fiber Optic Communication. 4. To study the applications of fiber optic communication systems.
	T.Y.B.Sc. SEM-IV	**Paper I: EL-341: Advanced Communication Systems**	1.To learn Antenna & Propagation 2.To learn Phase modulation & demodulation using PLL 3.To learn AM transmitters and FM Transmitters 4.To learn Pulse modulation, Pulse code modulation

		Paper II: EL-342: Microcontroller and its Applications	1. Use 'C' language for programming the microcontrollers 2. Learn to use Timers, Interrupts and Serial Communication in Microcontroller. 3. Apply the knowledge in real world applications
		Paper III: EL- 343: Power Electronics	1. To get introduce to basics of power electronics and familiar with Power Electronic Devices, circuits and applications 2. To learn about power devices and protections of devices 3. To study various types of power circuits 4. To study applications of power electronics
		Paper IV: EL -344: Foundation of Nanoelectronics	1. To learn essential principles of Electromagnetics 2. To know the principles of quantum mechanical aspects 3. To study the basics of Nanoelectronics
		Paper V: EL- 345: Mathematical Methods and Circuit Analysis using MATLAB	1. To learn features of MATLAB as a programming tool. 2. To promote new teaching model that will help to develop programming skills and technique to solve mathematical problems. 3. To understand Laplace Transform and Fourier series and its applications. 4. To use MATLAB as a simulation tool.
		Paper-VI: EL-346: B) Consumer Electronics	1. To learn features of Electronic equipments used in office and Home appliances. 2. To understand the block diagrams of various office and Home appliances.
	SEM-III & SEM-IV	**EL-347 Practical Course- I**	1. To refer the various datasheets of the electronic devices and integrated circuits 2. To learn how to select the devices, sensors, actuators and ICs for a particular application 3. To develop the basic skills required to handle the various instruments 4. To learn the designing aspects of circuits/ systems
		EL-348 Practical Course- II	1. To learn the basic C-Programming 2. To learn Verilog HDL to design basic combinational and sequential circuits 3. To get familiar with structural, data flow and behavioral modeling 4. To learn assembly level language of 8051 microcontroller 5. To use cross compiler to develop C-programs for microcontroller 6. To study the various interfacing circuits to 8051 microcontroller

		EL-349 Practical Course- III Project Work	1. The name and subject of the project type must be well defined. 2. Planning of the work must be specified. 3. Theoretical, reference work must be provided. 4. Pilot experimentations / Preparations must be specified. 5. Typical design aspects, theoretical aspects, aim and objectives of the work must be specified in detail. 6.The actual work done must be reported along with experimentation procedures. 7. There must be observations, interpretations, conclusions, results of the project work. 8. Algorithm, program strategy, module wise description of parts etc be provided in case of projects related with development of computer software. 9.Applications, usefulness, student's contribution in it must be clearly specified. 10.Further extension work may be suggested for better outcome of the project. 11.It is recommended to present the projects in competitions / project exhibitions organized by various authorities.

M. Sc. Course Outcome

Sr. No	CLASS	Name of Course	Course outcome
1	**M.Sc Part-I SEM-I**	**EL1UT01: Mathematical Methods in Electronics and Network Analysis**	1. To get familiar with role of differential equations in applied electronics 2. To know about mathematical tools and techniques for network analysis 3. To learn the methods of analysis for CT and DT signals and systems 4. To learn concept of mathematical modeling of simple electrical circuits
		EL1UT02: Analogue Circuit Design	1. To learn the characteristics and working of electronic devices 2. To study the various device models 3. To study the wideband and narrowband amplifiers using BJT 4. To develop skills in analysis and design of analog circuits 5. To study the designs of opamp applications
		EL1UT03: Digital System Design	1. To understand sequential and combinational logic design techniques 2. To introduce VERILOG 3. To learn various digital circuits using VERILOG 4. To learn PLD, CPLD, FPGA and their applications
		EL1UT04: Advanced 'C' Programming	1. To understand basic concepts of C programming language. 2. To learn various advanced features, graphics and interfacing 3. To learn concepts of object oriented programming in C++
		EL1UP01: Practical Course –I	1. To learn the characteristics and working of electronic devices 2. To study the various device models 3. To study the wideband and narrowband amplifiers using BJT 4. To develop skills in analysis and design of analog circuits

			5. To study the designs of opamp applications 6. To understand sequential and combinational logic design techniques
		EL1UP02: Practical Course –II	7. To introduce VERILOG 8. To learn various digital circuits using VERILOG 9. To learn PLD, CPLD, FPGA and their applications 3. To learn the methods of analysis for CT and DT signals and systems 4. To learn concept of mathematical modeling of simple electrical circuits using softwares
		EL1UP03: Practical Course –III (PLE)	a) The name and subject of the project type must be well defined. b) Planning of the work must be specified. c) Theoretical, reference work must be provided. d) Pilot experimentations / Preparations must be specified. e) Typical design aspects, theoretical aspects, aim and objectives of the work must be specified in detail. f) The actual work done must be reported along with experimentation procedures. g) There must be observations, interpretations, conclusions, results of the project work. h) Algorithm, program strategy, module wise description of parts etc be provided in case of projects related with development of computer software. i) Applications, usefulness, student's contribution in it must be clearly specified. j) Further extension work may be suggested for better outcome of the project.
M.Sc Part-I SEM-II			
2	**M.Sc Part-**	**EL2UT05: Applied Electromagnetics,**	1. To introduce to students the concepts of electromagnetics

	I SEM-II	**Microwaves and Antennas**	2. To understand the theory of transmission lines and wave guides 3. To study various parameters of antennas 4. To study various methods of generation of microwaves
		EL2UT06: Instrumentation and Measurement Techniques	1. To understand the configurations and functional descriptions of measuring instruments 2. To understand the basic performance characteristics of instruments 3. To understand the working principles of various types of sensors and transducers and their use in measuring systems 4. To study the techniques involved in various types of instruments 5. To understand the relevance of electronics with other disciplines
		EL2UT07: Embedded System Design	1. To understand the basics of embedded system 2. To understand the architecture, assembly language and interfacing of different 8-bit microcontrollers 3. To learn embedded C programming 4. To learn software techniques to embed codes in to the systems 5. To learn communication standards and protocols
		EL2UT08: Foundation of Semiconductor Devices	1. To introduce crystal structure with reference to semiconductors 2. To introduce quantum and statistical mechanics 3. To understand the characteristics of semiconductor devices 4. To introduce theory of diode, transistor and FETs
		EL2UP04: Practical Course –IV	1. To understand the working principles of various types of sensors and transducers and their use in measuring systems 2. To study the techniques involved in various types of instruments 3. To understand the relevance of electronics with other disciplines 4. To study various parameters of

			antennas
		EL2UP05: Practical Course –V	1. To understand the architecture, assembly language and interfacing of different 8-bit microcontrollers 2. To learn embedded C programming 3. To learn software techniques to embed codes in to the systems 4. To learn communication standards and protocols
		EL2UP06: Practical Course –VI (PLE)	a) The name and subject of the project type must be well defined. b) Planning of the work must be specified. c) Theoretical, reference work must be provided. d) Pilot experimentations / Preparations must be specified. e) Typical design aspects, theoretical aspects, aim and objectives of the work must be specified in detail. f) The actual work done must be reported along with experimentation procedures. g) There must be observations, interpretations, conclusions, results of the project work. h) Algorithm, program strategy, module wise description of parts etc be provided in case of projects related with development of computer software. i) Applications, usefulness, student's contribution in it must be clearly specified. j) Further extension work may be suggested for better outcome of the project.
M.Sc Part-II SEM-III			
3	**M.Sc Part-II SEM-III**	**EL3UT09: Communication Electronics**	1. To learn anlog modulation techniques 2. To study basics of information theory and digital communication 3. To study various data digital communication systems 4. To learn fundamentals of radio wave propagation and Antennas

			5. To make students aware of various communication technologies
		ELDT01: Advanced Power Electronics	1. To study the basic principles and applications of power electronics 2. To understand the solid-state devices required for power electronic circuits 3. To study and understand the power conversion and power transmission principles 4. To study the industrial and domestic applications
		ELDT08: Programmable Logic Controllers and Applications	1. To make the students aware of programmable logic controllerhardware 2. To introduce students to PLC programming 3. To study some case studies using PLC and introduce distributed control systems
		ELDT02: Advanced Embedded Systems	1. To study the architecture of Advanced RISC machine (ARM7) 2. To learn assembly level programming of ARM-7 and interfacing hardware 3. To get acquainted to fundamentals of operating system 4. To get familiar with real time operating system (RTOS) 5. To introduce one of RTOS in detail
		EL3UP07: Practical Course –VII	1. To study various data digital communication systems 2. To learn fundamentals of radio wave propagation and Antennas 3. To make students aware of various communication technologies 4. To impart information about control instrumentation 5. To make students familiar with latest trends in industrial control / production systems
		EL3UP08: Practical Course –VIII	1. To study the architecture of Advanced RISC machine (ARM7) 2. To learn assembly level programming of ARM-7 and interfacing hardware 3. To get acquainted to fundamentals of operating system 4. To get familiar with real time operating system (RTOS)

		EL3UP09: Practical Course –IX PLE	a) The name and subject of the project type must be well defined. b) Planning of the work must be specified. c) Theoretical, reference work must be provided. d) Pilot experimentations / Preparations must be specified. e) Typical design aspects, theoretical aspects, aim and objectives of the work must be specified in detail. f) The actual work done must be reported along with experimentation procedures. g) There must be observations, interpretations, conclusions, results of the project work. h) Algorithm, program strategy, module wise description of parts etc be provided in case of projects related with development of computer software. i) Applications, usefulness, student's contribution in it must be clearly specified. j) Further extension work may be suggested for better outcome of the project.
M.Sc Part-II SEM-IV			
4	**M.Sc Part-II SEM-IV**	**EL4UT10: Control Systems**	1. To make student familiar with basic concepts of control theory 2. To understand different control strategies 3. To develop problem solving attitude 4. To impart information about control instrumentation 5. To make students familiar with latest trends in industrial control / production systems
		ELDT04: Mechatronics	1. To introduce the students of Electronic Science to the subject of mechatronics 2. To review the concepts of sensors, transducers and actuators, with a view to use them in

			mechatronic systems 3. Enable the learner to acquire basic knowledge of mechanical systems to be used with electronic systems 4. To introduce the concept of models for electrical and mechanical systems and their combinations for building system models for predicting the behavior of electromechanical systems 5. To provide a quick overview of the communication systems and protocols used in Mechatronics
		ELDT06: Optoelectronics and Fiber Optic Communication	1. To become aware of different optoelectronic devices and systems 2. To acquire Knowledge of optical fiber communication system 3. To study optical fiber sensors and their applications
		ELDT13: Computational Methods for Electronics	1. To learn with the help of relevant illustrations in electronics. 2. Use of MATLAB and other software tools be made while discussing the importance of each of the topics. 3. Activities based on the survey and use of online sources available on internet be given to the students.
		EL3UP10: Practical Course X Project	a) The name and subject of the project type must be well defined. b) Planning of the work must be specified. c) Theoretical, reference work must be provided. d) Pilot experimentations / Preparations must be specified. e) Typical design aspects, theoretical aspects, aim and objectives of the work must be specified in detail. f) The actual work done must be reported along with experimentation

			procedures. g) There must be observations, interpretations, conclusions, results of the project work. h) Algorithm, program strategy, module wise description of parts etc be provided in case of projects related with development of computer software. i) Applications, usefulness, student's contribution in it must be clearly specified. j) Further extension work may be suggested for better outcome of the project.