



Course Outcomes (COs)

The course outcomes of the courses offered during the year 2023-24 from 1st year to 4th year of the undergraduate course of Electrical Engineering Program are given below:

Courses	Course Outcome Statements	
310022: Basic Electrical & Electronics Engineering	After the completion of this course, students will be able to:	
	310022.1	Solve dc & ac circuits by applying fundamental laws & theorems
	310022.2	Analyze magnetic circuits and resonance characteristics of ac electric circuits
	310022.3	Describe the working principle, construction, applications of single phase transformer & rotating electrical machines
	310022.4	Select the logic gates for various applications in digital electronic circuits
	310022.5	Explain the characteristics and parameters of Diode and Transistor
310022: Basic Electrical & Electronics Engineering Lab	After the completion of this course, students will be able to:	
	310022.1	Demonstrate the ability to operate lab equipment and instruments relevant to the electrical engineering field
	310022.2	Collect experimental data accurately and effectively
	310022.3	Integrate theoretical knowledge from coursework into practical applications and experiments
	310022.4	Communicate experimental results effectively through oral presentations and written documentation
	310022.5	Demonstrate responsibility and professionalism in the completion of lab tasks and assignments
3130101: Computer Programming	After the completion of this course, students will be able to:	
	3130101.1	Develop algorithms and flowchart for a given problem
	3130101.2	Describe the concepts of procedural programming
	3130101.3	Explain the concepts of object oriented programming and its significance in the real world
	3130101.4	Develop computer programs to solve real world problems
	3130101.5	Debug program effectively
3130102: Electrical Engineering Material	After the completion of this course, students will be able to:	
	3130102.1	Describe the properties and applications of conducting materials.
	3130102.2	Explain behavior of semiconductor materials, their classification and applications.
	3130102.3	Select appropriate Magnetic materials for given applications.
	3130102.4	Select appropriate insulating material depending upon specific requirement
3130201: Python Programming	After the completion of this course, students will be able to:	
	3130201.1	Interpret the fundamental Python syntax and semantics
	3130201.2	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets



	3130201.3	Identify the commonly used operations involving file systems and regular expressions.
	3130201.4	Discuss the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.
	3130201.5	Design GUI Applications in Python
3130202: Network Analysis	After the completion of this course, students will be able to:	
	3130202.1	Apply different networks laws & theorems for solving AC and DC electric networks.
	3130202.2	Compute the two-port parameters for given two port networks
	3130202.3	Solve series/parallel resonant and magnetically coupled circuits
	3130202.4	Solve three-phase circuits under balanced & unbalanced conditions
	3130202.5	Evaluate transient response behavior of a network for given initial conditions
3130203: Electrical & Electronics Measurement	After the completion of this course, students will be able to:	
	3130203.1	Explain the basic concepts of electrical and electronic measurement and measuring instruments.
	3130203.2	Compute errors in a measurement system
	3130203.3	Describe the construction and working of AC and DC bridges and their applications
	3130203.4	Describe digital measuring instrument, signal Generator, CRO for appropriate measurement
	3130203.5	Select appropriate transducers and A/D & D/A converters for measurement of physical quantity
3000003: Environmental Engineering	After the completion of this course, students will be able to:	
	3000003.1	Explain the fundamental concepts of energy, ecosystems & environment.
	3000003.2	Recognize various environmental problems and their effects.
	3000003.3	Apply various air & water remediation methods.
	3000003.4	Apply waste management techniques.
	3000003.5	Apply the concepts of sustainability
3130203: Electrical & Electronics Measurement Lab	After the completion of this course, students will be able to:	
	3130102.1	Handle an instrument and perform basic calibration
	3130102.2	Estimate the deviations in measurements due to possible errors and measures to minimize them based on their characteristics.
	3130102.3	Measure unknown resistance, inductance and capacitance
	3130102.4	Acquire teamwork skills for working effectively in groups
	3130102.5	Prepare technical report on experiments conducted in the lab
2130311: Electromagnetic Field Theory	After the completion of this course, students will be able to:	
	2130311.1	Apply vector calculus to understand the behavior of static electric fields in engineering configurations
	2130311.2	Describe Maxwell's equations in differential and integral forms and apply them to diverse engineering problems
	2130311.3	Formulate engineering problems of Electromagnetic, Electrostatic and Magnetic to Static circuits using Basic relations.
	2130311.4	Explain the nature of Electromagnetic wave propagation and wave polarization.



	2130311.5	Solve engineering problems of Electromagnetic
2130312: Electric Machines-I	After the completion of this course, students will be able to:	
	2130312.1	Explain the principles and construction of different AC and DC machines.
	2130312.2	Discuss the fundamental control practices such as starting, reversing, braking, plugging etc associated with AC and DC machines.
	2130312.3	Analyze the performance of AC and DC machines.
	2130312.4	Develop the equivalent circuits and compute the induced emf, torque, efficiency, losses etc.
	2130312.5	Describe various tests conducted for evaluating the performance of AC and DC machines.
	2130312.6	Evaluate the performance of machines under different operating conditions
2130313: Power System –I	After the completion of this course, students will be able to:	
	2130313.1	Describe the general structure of power systems
	2130313.2	Develop the knowledge of generation of electricity based on conventional and nonconventional energy sources
	2130313.3	Determine the transmission line parameters
	2130313.4	Analyze the performance of overhead transmission line
	2130313.5	Describe the concept of power plant economics
	2130313.6	Explain different types of tariffs and power factor improvement techniques
2130314: Analog & Digital Electronics	After the completion of this course, students will be able to:	
	2130314.1	Explain working principles of electronic devices e.g. Diode, Transistor, Amplifier, and Op-Amp.
	2130314.2	Categorize the different types of diode, Amplifier, Op-Amp, Flip-flop, logic gates and counters.
	2130314.3	Describe the various mathematical models of transistors
	2130314.4	Apply the various principles of digital electronics to design different types of Digital Electronics circuits for various applications.
	2130314.5	Evaluate the working of various digital electronics circuits like multiplexer, coder circuits, shift registers & counter
2130315: Self-Learning/ Presentation	After the completion of this course, students will be able to:	
	2130315.1	Refer various technical recourses available from multiple field
	2130315.2	Adhere to deadlines and commitment to complete the assignment
	2130315.3	Improve performance in self-learning domain
	2130315.4	Acquire additional knowledge for competitive examinations
2130316: Summer Internship Project	After the completion of this course, students will be able to:	
	2130316.1	Relate the theoretical aspects learned in classes into practical world
	2130316.2	Apply the new skills and supplement knowledge other than curriculum
	2130316.3	Practice communication and teamwork skills
	2130316.4	Apply the knowledge for placement & higher education
	2130316.5	Troubleshoot the problems related to particular experiment
2130312: Electric Machines Lab-I	After the completion of this course, students will be able to:	
	2130312.1	Draw characteristics of electric machine for a specific purpose, requirement.
	2130312.2	Determine the efficiency, regulation of any transformer.
	2130312.3	Integrate theoretical knowledge from coursework into practical applications and experiments



	2130312.4	Develop the ability to work in team and learn professional ethics
	2130312.5	Prepare an organized written engineering report
2130313: Power System Lab-I	After the completion of this course, students will be able to:	
	2130313.1	Simulate the performance of the Transmission line using MATLAB Simulink environment.
	2130313.2	Integrate theoretical knowledge from coursework into practical applications and experiments
	2130313.3	Show willingness to learn new techniques, tools, or methods to enhance practical engineering skills
	2130313.4	Develop teamwork skills for working effectively in groups
	2130313.5	Prepare an organized written engineering report
2130314: Analog & Digital Electronics Lab	After the completion of this course, students will be able to:	
	2130314.1	Integrate theoretical knowledge from coursework into practical applications and experiments
	2130314.2	Show willingness to learn new techniques, tools, or methods to enhance practical engineering skills
	2130314.3	Develop teamwork skills for working effectively in groups
	2130314.4	Prepare an organized written engineering report
2130411: Electrical Machines-II	After the completion of this course, students will be able to:	
	2130411.1	Explain the constructional details and working principle and various configurations of three phase transformers.
	2130411.2	Analyze the performance of 3-phase induction and synchronous machines using equivalent circuits & phasor diagrams under different loading conditions.
	2130411.3	Calculate voltage regulation of three phase synchronous machines
	2130411.4	Determine time constant, various sequence reactance and equivalent circuit parameters under transient conditions for synchronous machines.
	2130411.5	Analyze the effects of excitation and mechanical input on the operation of synchronous machines.
	2130411.6	Analyze the behavior of synchronous machine connected to infinite bus and parallel operation of alternators.
2130412: Power System-II	After the completion of this course, students will be able to:	
	2130412.1	Explain the concepts of single line diagram and per unit system
	2130412.2	Apply different load flow techniques to solve load flow problem
	2130412.3	Perform fault calculations for symmetrical and unsymmetrical faults
	2130412.4	Explain the theoretical and practical aspects of Power System Stability, and its enhancement
	2130412.5	Elucidate the automatic generation control reactive power, voltage control, series and shunt compensation
	2130412.6	Discuss the insulation resistance, capacitance of various types of cables and the need of HVDC transmission.
3130413: Microprocessors & Embedded Systems	After the completion of this course, students will be able to:	
	2130413.1	Describe the fundamentals of microprocessor along with the peripheral interface devices.
	2130413.2	Describe architecture, memory organization, operation and interfacing of 8051 microcontroller.



	2130413.3	Create Arduino development program using libraries for communication with devices & sensors.
	2130413.4	Configure Raspberry Pi in Python environment
	2130413.5	Develop interfacing between different sensors and Arduino / Raspberry Pi
3130414: Renewable Energy Lab	After the completion of this course, students will be able to:	
	2130414.1	Develop the understanding of renewable energy sources.
	2130414.2	Investigate the solar PV & wind energy operation and find their performance curves.
	2130414.3	Examine smart house & load analysis kit.
	2130414.4	Develop teamwork skills for working effectively in groups.
	2130414.5	Prepare a technical report on experiments conducted in the lab.
3100009: Cyber Security	After the completion of this course, students will be able to:	
	3100009.1	Explain the terminologies of Cyber Security, networking & Internet.
	3100009.2	Analyze methods used to protect data in the internet environment in real world situations.
	3100009.3	Discover the concept of IP security & architecture.
	3100009.4	Compare the types of Cyber security threats/vulnerabilities.
	3100009.5	Develop the understanding of cybercrime investigation and IT ACT 2000.
2130411: Electric Machine Lab-II	After the completion of this course, students will be able to:	
	2130411.1	Demonstrate the fundamental control practices associated with AC machines such as starting, reversing, braking, plugging, etc.).
	2130411.2	Conduct test on electrical machines for computing the efficiency, regulation and parameters of equivalent circuit.
	2130411.3	Develop the ability to work in team with professional ethics
	2130411.4	Prepare an organized written report
	2130411.4	Demonstrate the fundamental control practices associated with AC machines such as starting, reversing, braking, plugging, etc.).
2130412: Power System Lab -II	After the completion of this course, students will be able to:	
	2130412.1	Demonstrate the ability to operate lab equipment and instruments relevant to the electrical engineering field
	2130412.2	Collect experimental data accurately and effectively
	2130412.3	Integrate theoretical knowledge from coursework into practical applications and experiments
	2130412.4	Communicate experimental results effectively through oral presentations and written documentation
	2130412.5	Demonstrate responsibility and professionalism in the completion of lab tasks and assignments
	2130412.6	Show willingness to learn new techniques, tools, or methods to enhance practical engineering skills
2130413: Microprocessors & Embedded Systems Lab	After the completion of this course, students will be able to:	
	2130413.1	Implement the program on 8085 kit.
	2130413.2	Develop the programs for 8051 interfacing
	2130413.3	Design the hardware for different IoT applications using Arduino/Raspberry PI and Sensors
	2130413.4	Develop teamwork skills for working effectively in groups.
	2130413.5	Prepare technical report on experiments conducted in the lab



2130511: Signals & Systems	After the completion of this course, students will be able to:	
	2130511.1	Explain the process of sampling and the effects of under sampling.
	2130511.2	Classify systems based on their properties and determine the response of LSI system using convolution.
	2130511.3	Apply the concepts of linear algebra to signals.
	2130511.4	Analyze the spectral characteristics of continuous-time periodic and a periodic signal using Fourier analysis.
	2130511.5	Analyze system properties based on impulse response and Fourier analysis.
2130512: Control System	After the completion of this course, students will be able to:	
	2130512.1	Develop mathematical models of mechanical system, electrical system and electromechanical system.
	2130512.2	Represent the complex system into standard canonical form by signal flow graph and block diagrams reduction rules.
	2130512.3	Compute the time and frequency-domain responses of first and second-order systems to standard inputs.
	2130512.4	Formulate control engineering problems in state-variable form.
2130513: Power Electronics	After the completion of this course, students will be able to:	
	2130513.1	Explain static & dynamic characteristics of power electronics devices like Diode SCR, BJT, MOSFET and IGBT. etc
	2130513.2	Explain the configuration of different commutation methods.
	2130513.3	Describe the configuration of AC to DC converter, Dual converter, chopper, cyclo-converter.
	2130513.4	Develop different model of different converters to calculate their performance parameter
2130514: Switchgear & Protection	After the completion of this course, students will be able to:	
	2130514.1	Explain the concepts, theories and features associated with protective devices and circuit breakers.
	2130514.2	Classify relays and circuit breakers based on criterion such as construction, type of supply, working principle, actuating quantities.
	2130514.3	Select relays and circuit breakers for specific equipments and applications.
	2130514.4	Design protection schemes for generators, motors, transformers and transmission lines.
	2130514.5	Analyze the behavior and performance of relays under different loading levels and faults.
2130515: Data Sciences	After the completion of this course, students will be able to:	
	2130515.1	Describe Data Science techniques and various tools such as file execution, variable creations, etc.
	2130515.2	Use control structures and exploratory data analysis for Data processing.
	2130515.3	Evaluate the nature of data using descriptive statistics.



	2130515.4	Apply Data cleaning techniques for effective interpretation.
	2130515.5	Apply data science techniques to analyze and optimize within the field of electrical engineering, including power systems, electrical machine learning and control smart grids, and renewable energy
2130512: Control System Lab	After the completion of this course, students will be able to:	
	2130512.1	Integrate theoretical knowledge from coursework into practical applications and experiments
	2130512.2	Investigate the properties of different Controllers.
	2130512.3	Develop teamwork skills for working effectively in groups.
	2130512.4	Prepare a technical report on experiments conducted in the lab.
2130513: Power Electronics Lab	After the completion of this course, students will be able to:	
	2130513.1	Demonstrate VI characteristics of Semiconductor Devices and Various Firing scheme of SCR.
	2130513.2	Demonstrate the performance of various converters AC to DC and DC to AC converter
	2130513.3	Compare the performance of single and three phases VSI Inverter.
	2130513.4	Demonstrate the performance of converters in its different modes of operation.
	2130513.5	Prepare an organized written report.
2130513.6	Develop the ability to work is team and learns professional ethics.	
2130514: Switchgear & Protection Lab	After the completion of this course, students will be able to:	
	2130514.1	Validate the characteristics & performance of various Relays
	2130514.2	Prepare an organized written report.
	2130514.3	Develop the ability to work in a team
	2130514.4	Learn professional ethics.
2130515: Data Science Lab	After the completion of this course, students will be able to:	
	2130515.1	Write the programs using libraries NumPy, Matplotlib to work with the datasets
	2130515.2	Demonstrate technical skills related to data science
	2130515.3	Prepare an organized written report.
2130515.4	Develop the ability to work is team and learns professional ethics.	
2130516: Minor Project-I	After the completion of this course, students will be able to:	
	130505.1	Formulate the real-world problems.
	130505.2	Express the technical ideas, strategies and methodologies.
	130505.3	Utilize the new tools, algorithms, techniques to obtain solution of the project.
	130505.4	Prepare oral demonstrations.
2130517: Summer Internship Project-II (Evaluation)	After the completion of this course, students will be able to:	
	130506.1	Exhibit the characteristics of industrial environment.
	130506.2	Apply the technical knowledge in real industrial situations.
	130506.3	Write the report in technical work/project.
	130506.4	Show engineer's responsibilities & ethics.
2130518: Self- learning/Present ation	After the completion of this course, students will be able to:	
	130507.1	Refer various technical recourses available from multiple field.
	130507.2	Adhere to deadlines and commitment to complete the assignment.
	130507.3	Improve his/her performance in self learning domain.



	130507.4	Acquire additional knowledge helpful for competitive examinations.
130717: Utilization of Electrical Energy	After the completion of this course, students will be able to:	
	130717.1	Analyze the operating principles and characteristics of traction motors with respect to speed, temperature, loading condition
	130717.2	Describe different types of heating and welding techniques
	130717.3	Explain principles of illumination and its measurement
	130717.4	Explain basic principle of electric traction including speed–time curves of different traction services
	130717.5	Describe braking, acceleration and other related parameters of traction system, including demand side management.
130718: Electric Drives	After the completion of this course, students will be able to:	
	130718.1	Describe various components of a drive system along with modes of operation, control needs and identify stable/unstable regions
	130718.2	Explain various drives & loads, their characteristics and control methods under various operating
	130718.3	Explain performance analysis & control of ac & dc drives
	130718.4	Describe working static converters for speed control of different types of drives
	130718.5	Explain the functioning of solar, battery powered and traction drives and explain energy conservation methods
130719: Electric Vehicle	After the completion of this course, students will be able to:	
	130719.1	Interpret the environmental importance of electric vehicles and their role in society.
	130719.2	Analyze electric drive train topologies and propulsion mechanisms used in EVs
	130719.3	Design energy storage and management strategies for V2G and G2V concepts.
	130719.4	Analyze dynamics of EVs for constant and variable tractive efforts and charging.
	130719.5	Select different components and sizes of EVs.
910205: Applications of Electrical Equipment & Motors	After the completion of this course, students will be able to:	
	910205.1	Discuss the safety procedures involved with electrical equipment.
	910205.2	Describe the working principle of substation equipment
	910205.3	Explain the basics of lighting and illumination and its parameters and able to design Illumination systems for various applications.
	910205.4	Apply the electrical energy applications for traction and understand the power electronics technology in efficient utilization of electrical power.
910206: Sensor Technology	After the completion of this course, students will be able to:	
	910206.1	Explain fundamentals of sensors & transducers.
	910206.2	Describe physical principles of sensing.
	910206.3	Compare various sensor materials and technology used in designing sensors.
	910206.4	Select appropriate sensor for given application.
130720: Electrical Drives Lab	After the completion of this course, students will be able to:	
	130720.1	Compare the performance of converters with and without modulation
	130720.2	Plot the characteristics of drives with changing parameters.
	130720.3	Analyze advantages & limitations of various converters used in industrial drives.
	130720.4	Develop teamwork skills for working effectively in groups.



	130720.5	Prepare technical report on experiments conducted in the lab
130721: Industrial Automation Lab	After the completion of this course, students will be able to:	
	130721.1	Perform the programming of PLC ladder diagrams
	130721.2	Select appropriate Logic Gate operations
	130721.3	Analyze industrial automation system with sequential machines control
	130721.4	Develop small application using PLC & sensors to the real world
	130721.5	Develop teamwork skills for working effectively in groups.
100007: Disaster Management	After the completion of this course, students will be able to:	
	100007.1	Propose disaster prevention and mitigation approaches.
	100007.2	Classify global and national disasters, their trends and profiles.
	100007.3	Appreciate the impacts of various disasters.
	100007.4	Apply Disaster Risk Reduction in management.
100007.5	Find the linkage between disasters, environment and development	
900104: Energy Conservation & Management	After the completion of this course, students will be able to:	
	900104.1	Explain the basic concepts of Energy Audit & its various terminologies, rules and regulations, policy and how to write reports.
	900104.2	Acquire fundamental knowledge on the science of energy and on both the conventional and non-conventional energy technologies
	900104.3	Describe different energy auditing methods and the implementation procedures
	900104.4	Identify present scenario of energy utilization, management and corresponding ACT of regulatory commission
900104.5	Recognize process billing, energy tariff and power factor improvements to achieve energy efficient systems.	
910105: Biomedical Instrumentation	After the completion of this course, students will be able to:	
	900105.1	Describe the origin of bio potentials and the role of bio potential electrodes & transducers
	900105.2	Apply the physical and medical principles in the measurements of cardiovascular system parameters
	900105.3	Discuss the physical and medical principles used a respiratory system measurement
	900105.4	Identify the patient safety issues related to biomedical instrumentation
900105.5	Discuss the techniques for noninvasive Diagnostic Instrumentation	
910106: Industrial Automation	After the completion of this course, students will be able to:	
	900105.1	Analyze architecture of industrial automation system
	900105.2	Select appropriate sensors
	900105.3	Acquire the knowledge of PID control technique
	900105.4	Develop small application using PLC & transducer,
900105.5	Compare AC and DC drives for particular applications.	
100008: Intellectual Property Rights(IPR)	After the completion of this course, students will be able to:	
	100008.1	Imbibe the knowledge of Intellectual Property and its protection through various laws
	100008.2	Apply the knowledge of IPR for professional development
	100008.3	Develop a platform for protection and compliance of Intellectual Property Rights & knowledge
	100008.4	Create awareness amidst academia and industry of IPR and Copyright compliance
100008.5	Deliver the purpose and function of IPR and patenting.	



		Imbibe the knowledge of Intellectual Property and its protection through various laws
130831 : Project	After the completion of this course, students will be able to:	
	130831.1	Formulate the real world problems.
	130831.2	Express the technical ideas, strategies & methodologies.
	130831.3	Utilize the new tools, algorithms, techniques to obtain solution of the project.
	130831.4	Test & validate the developed prototype/results.
	130831.5	Write a project report.
130831 : Internship	After the completion of this course, students will be able to:	
	130831.1	Identify job skills, knowledge, and attitude requisite to constitute a professional identity.
	130831.2	Express the technical ideas, strategies & methodologies
	130831.3	Demonstrate profession ethics and awareness about general workplace behavior
	130831.4	Adhere to deadlines and commitment to complete the assignment.
	130831.5	Write professional work reports and presentations.
130802 : Professional Development	After the completion of this course, students will be able to:	
	130832.1	Develop intellectual curiosity, competency and skills
	130832.2	Develop critical thinking, creativity and effective communication
	130832.3	Display professionalism and ownership of professional growth and learning