# ELECTRONICS CURRICULLUM

**COURSE DETAILS:**

**COURSE TITLE:** Communication Skills.
**COURSE CODE:** ECH-111

- Basic concepts of communications, Introduction to communication process, Seven Cs of communication.
- verbal and non-verbal communication, use of Audio-Visual Aids, basics of group communication
- Basic presentation skills, Presentation Strategies and public speaking skills

**COURSE TITLE:** Calculus and Analytical Geometry
**COURSE CODE:** ECN-111

- Definition of derivatives: differentiation of different function, rule of differentiation, chain rule implicit differentiation , Definition of definite integrals: Application of definite integral
- Vectors in space: vector calculus, divergence, curl of vector field, directional derivatives
- Vectors in plane: Dot product and cross products, line, and plane in space.

**COURSE TITLE:** Islamic Studies/Social Ethics
**COURSE CODE** (ECH-112) /(ECH-113)

- History of Islam: Compilation of the Holy Quran and Hadith, fundamental doctrine of Islam
- Importance of preaching of Islam: its needs and effects, difficulties in the ways of preaching of Islam. Sectarianism, Life of Holy Prophet (Peace Be upon him), Islam and civilization
- Knowledge and Islam: Definition of Knowledge, classification of knowledge, importance of technology in the light of Holy Qur'an and Sunnah

**COURSE TITLE:** Applied Physics
**COURSE CODE:** ECN-111

- fundamental physical principles and laws i-e Gauss's law, Ohm's law, Biot Savart law and its applications, Ampere's law, Faraday's law of induction, Lenz's law.
- Constructing basic circuits and demonstration of relevant theorems using Resistors and Capacitors.
- Capacitors, calculating capacitance, Capacitors in series and parallel, Factors affecting capacitance, Application of Capacitors, Current and Conductors, Electric current and current density, Resistance and resistivity

**COURSE TITLE:** Information and Communication Technology
**COURSE CODE:** ECC-111

- Introducing Computer Systems, Basic Operations and Components of a Generic Computer System, Processing Data,
- The Internet and the World Wide Web- browsers, Introduction to Embedded Systems
- Networking Basics, Database Management: Hierarchy of Data, Maintaining Data, Database Management Systems, Exposure to ICT Tools.

**COURSE TITLE:** Workshop Practices
**COURSE CODE:** ECT-111

- Use of carpenter's tools, Exercise in preparing simple joints, Bench fitting practice, Exercise in marking and fittings , Smith's forge, Introduction to various technical facilities in the workshop including mechanical and electrical equipment Concepts in electrical safety.
- Types of cables and electric accessories including switches plugs, circuit breakers, fuses etc., symbols for electrical wiring schematics e.g., switches, lamps, sockets etc.
- PCB designing, transferring a circuit to PCB, etching, drilling, and soldering component on PCB testing.

**COURSE TITLE:** Linear Circuit Analysis
**COURSE CODE:** ECT-121

- Electrical elements and circuits: Resistance, inductance, and capacitance. Difference between AC and DC. Laws of resistances: Ohm's law, Kirchhoff's laws, circuits containing resistance, capacitance, and inductance
- Circuit analysis techniques, Mesh/Loop analysis. Nodal analysis of circuits with DC source.
- Network theorems employing Thevenin and Norton theorem. Principle of superposition. Reciprocity and maximum power transfer theorem.

**COURSE TITLE:** Differential Equations
**COURSE CODE:** ECN-121

- Basic concept of differential equation, I.e., Definition, order, degree, and geometric meaning of Diff: equation. Solution of First order Diff. Equation.
- Second and higher order Differential Equation: Homogenous linear ODE with constant coefficient, Cauchy Euler Equation, Non-homogenous Equation by undetermined coefficient
- Finding Laplace and inverse-Laplace of different functions, S-shafting theorem, solution of differential equations using Laplace transform

**COURSE TITLE:** Pakistan Studies
**COURSE CODE:** ECH-121

- Pakistan ideology, Indus Civilization, Location and Geo-Physical features, Reformist Movement in Subcontinent.
- Muslim League 1906, Lahore Resolution 1940, 3rd June plan and Independence 1947, Constitution and Law, Constitutional Assembly, Nature and Structure of Constitution, Features of 1956, 1973 Constitutions. Economic institutions and issues, Society and social

**COURSE TITLE:** Solid State Electronics
**COURSE CODE:** ECT-121

- General concepts of Solid-State Physics, differences between metals, insulators, and semiconductors and origin of their properties, intrinsic and extrinsic semiconductors, and role of doping in engineering the properties of semiconductor structures.
- Fabrication process of silicon wafers, starting from silica. Generation and recombination of charge carriers in semiconductors under electrical, optical, and thermal excitation, and transport of these carriers under an electric field

**COURSE TITLE:** Computer Programming
**COURSE CODE:** ECC-121

- Introduction to C++ , Data Types and Operators , Arithmetic Operations
- Repetitive Statements/Loops, Functions, Iteration (for Loop, While, Do-While), Iteration (Do-While) Recursion, File Handling , Structures Arrays- One Dimensional , Sorting Algorithms, Arrays – Two Dimensional
- Strings, Pointers

**COURSE TITLE:** Technology Economics & Management
**COURSE CODE:** ECM-121

- Basic concepts, technological economy defined, types of business organizations, financial statements and financial ratios, time value of money, cash flow series and its types, basic cost concepts.
- Profit and interest, discrete and continuous compounding, nominal and effective interest rate. Economic analysis of alternatives: Alternatives having identical lives:
- Replacement and retention decisions, depreciation, amortization, and depletion of economic resources. Price, supply and demand relationship. Project financing.

**COURSE TITLE:** Organizational Behavior
**COURSE CODE:** ECS-121

- Overview, Introduction to the field of organizational behavior, motivation, individual and group behavior, personality and values, perceiving ourselves and others in organizations.
- workplace emotions, attitudes, and stress foundations of employee motivation, applied performance practices, decision making and creativity, team dynamics, communicating in organizations,
- Power, politics, conflict and negotiation in the workplace, leadership in organizational settings, designing organizational structure, culture, change and development.

**COURSE TITLE:** Electrical Network Analysis
**COURSE CODE:** ECT-121

- Current and voltage transients, RLC circuits with DC and AC excitation, resonant circuit: series and parallel resonance in AC circuit, Q-Factor, self and mutual inductances.
- Introduction to phasor representation of alternating voltage and current, star-delta transformation for AC circuits, phase sequence, vector diagrams of three phase networks
- Two-port networks and their interconnections. Application of Laplace transform in circuit analysis and introduction to difference equations

**COURSE TITLE:** Linear Algebra
**COURSE CODE:** ECN-211

- Algebra of matrices; inverse of a matrix; Gauss-Jordan method, vectors in the plane and in three dimensions, vector spaces, subspace, span and linear independence.
- Determinant; inverse of a matrix; applications of determinants.
- Hermitian matrices; singular value decomposition; quadratic forms; positive definite matrices; non-negative matrices; floating-point numbers; Gaussian elimination
- Eigenvalue problem; least square problems, Vectors in 2-Space and 3-Space, Inner Product (Dot Product) Vector Product (Cross Product), Vector and Scalar Functions and Their Fields.

**COURSE TITLE:** Digital Electronics
**COURSE CODE:** ECT-212

- Number Systems, Complement, Boolean Algebra, Logic Simplification, K-Map, Universal Gate, Combinational Logic, Sequential Logic.
- Latches, Flip-Flops (SR, JK, data and toggle) and their applications. Adders (half adder and full adder).
- Multiplexers and DE multiplexers, Counters (synchronous and asynchronous), Shift Registers (left and right registers), and simple Arithmetic Logic Unit (ALU).

**COURSE TITLE:** Professional Ethics
**COURSE CODE:** ECS-212

- Introduction to ethics, personal and professional ethics, the nature of engineering ethics; legal, professional, and historical definitions, benefits of acting ethically and consequences of acting unethically.
- Values in professional ethics, central responsibility of engineering technology professionals, ethics in different fields of work, IEEE code of ethics, ethical code for engineering technology professionals
- Common ethical dilemmas, resolution of ethical dilemmas, possible actions in response to dilemmas, probable consequences of these actions.

**COURSE TITLE:** Technical Drawing
**COURSE CODE:** ECC-211

- Mechanical Drawing: Sheet layout, free hand sketching, basic drafting techniques, drawing and lettering, dimensioning
- Civil Drawing: Plans, Elevations and Sections.
- Electrical Drawing: Electrical safety drawings, electric substation equipment layout, schematic diagrams of substations, lighting, and power distribution boards in contrast with house and industrial wiring diagrams, electrical symbols and one-line diagrams of a typical power system and its parts using all details

**COURSE TITLE:** Electronic Devices
**COURSE CODE:** ECT-213

- Physics of semiconductor, concept of Doping, formation of P & N type semiconductor, PN junction formation, Diode Characteristics curve, resistances in Diode, Ideal & practical Models, Q-point, Diode as Half wave & Full wave Rectifier, Diode Switching Circuit.
- Introduction to Clippers, Clippers Circuits, Clampers Circuits, Bipolar Junction Transistors, Common Base Characteristics, Common Emitter Characteristics, Common collector Characteristics, Bias Circuits, BJT as inverter, Transistor types, rating & specification.
- Special purpose Diodes, Field Effect Transistors, JFET, JFET current source, JFET Analog switch, JFET Biasing, JFET as Analog switch, Chopper, MOSFET types & configuration.

**COURSE TITLE:** Electrical Machines
**COURSE CODE:** ECT-221

- Magnetic Circuits and Calculations. Linear DC machines. Transformers: Principle of Operation, Construction, Types, Instrumentation Transformers.
- DC Machines: Construction, Types, Armature Reaction, Torque Speed Characteristics, Measurement of Losses and Efficiency.

- AC Machines: AC Machine Armature Winding, Induced EMF. Synchronous Generator. Special Purpose Motors, Introduction to Brushless DC Motor. Switched-Reluctance Motor. Stepper Motor.

**COURSE TITLE:** Technical Report Writing
**COURSE CODE:** ECH-221

- Introduction to technical writing, technical communication process, proposal write-up and improvement strategies, introduction to research and research types.
- Choosing research problems and research advisors, how to carry out research, different parts of technical writing, formulation – problem statement, literature review, design – methodology.
- Analysis - data analysis and interpretation good writing style techniques, uses of correct words, presenting and publishing research, write business/professional correspondence, cover letter and CV, writing meeting minutes, introduction to informal writing, uses of informal reports.

**COURSE TITLE:** Instrumentations and Measurements
**COURSE CODE:** ECT-222

- Precision measurements terminologies including resolution, sensitivity, accuracy, and uncertainty; engineering units and standards. Principles of different measurement techniques; instruments for measurement of different electrical parameters.
- Modern instrumentation techniques; static and dynamic responses of instrumentation and signal conditioning; basic data manipulation skills using personal computers and graphs; data acquisition systems.
- Principles of operation, construction and working of different analog and digital meters, Types of bridges for measurement of resistance, inductance, and capacitance; power and energy meters; high-voltage measurements.

**COURSE TITLE:** Amplifiers and Oscillators
**COURSE CODE:** ECT-223

- Classification of Amplifiers based on Biasing, Class A Amplifier, Class B Amplifier, Class AB Amplifier, Class C Amplifier. Push-Pull Amplifier, and Complementary Symmetry Amplifier.
- Classification of Amplifiers Voltage Feedback Amplifier, Current Feedback Amplifier, Effect of Feedback on Frequency Response.
- Practical Amplifier Considerations: Input and Output Impedance, Amplifier Loading, Impedance Matching. Oscillators: Basic Theory, Tank Circuit, Damped and Un-damped Oscillations.

**COURSE TITLE:** Microprocessors and Microcontrollers
**COURSE CODE:** ECT-224

- Introduction to Intel family microprocessors, instruction set architecture (ISA). Assembly Language Programming, hardware model, read/write cycles, exception/interrupt processing, I/O devices, DMA, interfacing to memory and I/O devices.
- Introduction to PIC/Atmel 8051.
- Introduction to microcontrollers; architecture and programming, Arithmetic Instructions, Logic Instructions, Program Control Instructions, Introduction to Interrupts

**COURSE TITLE:** Signals and Systems
**COURSE CODE:** ECT-225

- Continuous-time and discrete-time signals; commonly encountered signals; unit impulse and unit step functions; sampling and aliasing; continuous-time and discrete-time systems; basic properties. Linear Time-Invariant Systems.
- Fourier Series Representation of Periodic Signals, Fourier Transform, Properties; convolution and multiplication properties. Discrete-Time Fourier Transform, Properties; convolution and multiplication properties.
- Laplace Transform, Region of convergence; inverse Laplace transform; properties; analysis of LTI systems using the Laplace transform. Z-Transform, inverse z-transform, properties, analysis of LTI systems using the z-transform.

**COURSE TITLE:** Communication Systems
**COURSE CODE:** ECT-311

- Basic definitions; modulation and de-modulation techniques: amplitude, angle, pulse modulation, digital modulation techniques.
- Information theory; error detection and correction.
- Multiplexing techniques; noise and its effects on signal transmission; BER performance of various modulation techniques under noisy environment.

**COURSE TITLE:** Control Systems
**COURSE CODE:** ECT-312

- Introduction to control systems; open-loop and closed-loop systems, Transfer functions; block diagrams, signal flow graphs.
- Introduction to modeling; formation of differential equations of electrical, mechanical, and other systems, transfer functions.
- Stability; Routh's stability criterion, types, and analysis of feedback control systems; root locus, transfer function matrices; PID controllers and compensators.

**COURSE TITLE:** Numerical Analysis
**COURSE CODE:** ECN-311

- Mathematical preliminaries and error analysis, round- off errors and computer arithmetic, Divided Differences, use of Divided-difference Table.
- Newton's Interpolation Polynomial, Interpolation with Equally Spaced Data, Newton's Forward & Backward Difference Formulae, Gauss Formulae, Stirling's Interpolation Formula, Bessel's Interpolation Formula, Solution of Nonlinear Equations by Bisection Method, Regula Falsi, Secant, Newton-Raphson Method, Gauss Seidel Method. Numerical Differentiation, Numerical Differentiation Formulae Based on Equally Spaced Data.
- Numerical Differentiation Based on Lagrange's Formula. Factorization for Linear System.

**COURSE TITLE:** Entrepreneurship
**COURSE CODE:** ECM-311

- The concept of Entrepreneurship, the economist view of Entrepreneurship, the sociologist view, Behavioral approach, Entrepreneurship and Management.
- Entrepreneurial profile, Trait approach to understanding Entrepreneurship, Factors influencing Entrepreneurship, the environment.
- Devising Entrepreneurial marketing plan, Entrepreneurial marketing strategies, Product quality and design, Role of Entrepreneur in the economic development generation of services.

**COURSE TITLE:** Industrial Electronics
**COURSE CODE:** ECT-312

- Electric heating: Principles and applications; induction and dielectric heating; high-frequency welding. Spot welding control, Industrial control: Speed control of DC, AC, and servo motors.
- Process control. Measurement of non-electrical quantities: Temperature, displacement, pressure, time, frequency; digital industrial measuring systems, Ultrasonic generation, and applications.
- X-ray applications in industry. Photo-electric devices, Industrial control using PLCs. Data acquisition. Distributed control system in process industries, Industrial safety, and its techniques to avoid any hazard using proactive approach

**COURSE TITLE:** Power Electronics
**COURSE CODE:** ECT-321

- Introduction to power electronics; solid-state devices used in power electronics: power diode. Power BJT, power MOSFET, SCR, GTO, GBT, TRIAC, DIAC.
- Semi controlled, fully-controlled and uncontrolled rectifiers: single-phase and three-phase, six-pulse, twelve-pulse and twenty-four pulse rectifiers.
- Single-phase and three-phase inverters;44 pulse-width-modulated (PWM) inverters. UPS; types of converters; switched mode power supplies, AC and DC motor drives.

**COURSE TITLE:** Industrial Automation
**COURSE CODE:** ECT-322

- Introduction to Industrial Automation, architecture of industrial automation. Measurement system specifications, industrial measurement. Sensors (all types)
- Analog to Digital conversion of sensor output. control of dc and ac motors, stepper motor control, servo motors control, position control friction, backlash and resilience machine tool control, remote position control; process control, pneumatic controllers
- Programmable Logic Control Systems and their evolution, Architecture of PLC. Architecture of PLC. PLC programming languages. PLC software environment+ Ladder programming Introduction.

**COURSE TITLE:** VLSI Technology
**COURSE CODE:** ECT-323

- Review of Integrated Electronics. Basic terminologies, size and complexities, overview of IC design process, economics, yield, trends in VLSI technology.
- Integrated Circuit Technology. IC production process, semiconductor processes, design rules and process parameters. Modes of Transistor, Device Modelling.
- DC characteristics of CMOS Inverter, Noise Margin, Introduction to Static & Dynamic Logic Circuits, Structural & Behavioural Modelling of Combinational & Sequential Logic Circuits with VHDL/Verilog language.

**COURSE TITLE:** Foreign Language (Chinese Language)
**COURSE CODE:** ECT-321

- Introduction to trends and emergence of Chinese language, Chinese Language philosophy
- 300 new Chinese words and 50 fundamentals of Chinese grammar, sentences, and some communicative functions such as Greetings, Making an Acquaintance, Making an Inquiry to carry on conversations.
- Chinese language basics for reading initials, finals, and tones (phonetics and pronunciation), language principles to write the characters

**COURSE TITLE:** Project Management
**COURSE CODE:** ECM-414

- Introduction to Management, History of management, functions and functional areas of management, Introduction to Project Management, Project Quality Management.
- Project Stakeholder Management, Project Cost Estimating and Budgeting, Project Risk Management.
- Project Time Management, Project Management Tools, Introduction and use of project management tools like MS project and primavera, Emerging trends in project management, Six Sigma Project Management Tools

**COURSE TITLE:** Electronics Troubleshooting and Testing
**COURSE CODE:** ECT-415

- Electronic circuit troubleshooting, Electronic circuits testing, Safety guidelines for troubleshooting and testing, High voltages and high currents safety guidelines.
- Magnetic circuit/equipment safety guidelines, Fault finding techniques in electric and electronic circuits, Basic troubleshooting techniques.
- Tools used in troubleshooting and testing of electronic circuits, testing electric components with a Multimeter. Testing electronic components in PCB, Practice more to enhance the troubleshooting and testing skills.

**COURSE TITLE:** FPGA-based Technology
**COURSE CODE:** ECT-327

- Overview of the applications in digital systems. Hardware Description Languages (HDL); Selection of HDL Language, Fundamentals of Language, Design and Modeling of combinational & sequential circuits, simulation & synthesis.
- Implementation Technologies; Programmable Array Logic, Programmable Logic Array, Complex Programmable Logic Devices (CPLD), Field Programmable Gate Array (FPGA) Technologies.

**COURSE TITLE:** Embedded Systems
**COURSE CODE:** ECT-411

- Introduction to elements of embedded systems and their applications, Trends and challenges in embedded system, Modern methodologies.
- Hardware/software tradeoffs, use of single-purpose processors (hardware), use of General-purpose processors (software), General Purpose computer architecture, pipelining, Data path, memories and peripherals.
- Custom single purpose computer architecture, Standard single purpose computer architecture, Firmware, Firmware development and debugging, hardware/firmware partitioning.

**COURSE TITLE:** Integrated Circuits Fabrication
**COURSE CODE:** ECT-324

- Introduction to Silicon Wafer Processes such as Raw Materials & Purification, CZ & FZ Crystal Growth Methods to develop Ingot tube, Liquid-Encapsulated Czochralski GaAs Growth.
- Wafer & Die Preparation methods, Cleaning steps, Clean room, Common airborne contaminants, Containment Reduction: Level 1, 2 & 3, IC Fabrication Processes.

- Epitaxy, Oxidation, Lithography, Etching, Diffusion, Ion Implantation, Film Deposition, Packaging, VLSI Process Integration

**COURSE TITLE:** Electromagnetic Field Theory
**COURSE CODE:** ECT-325

- Vector algebra, coordinate systems and transformations, Vector calculus, electrostatic fields in materials, electrostatic boundary value problems, resistance, and capacitance calculation.
- Magneto-static fields, magneto-static fields and materials, inductance calculation. Faraday's Law, displacement current and Maxwell's equation.

**COURSE TITLE:** Opto-Electronic Devices
**COURSE CODE:** ECT-412

- An Introduction to optoelectronics, Introduction to optical materials, Incandescent, discharge, and arc lamp sources, Detection of optical radiation, Propagation along optical fibers and waveguides.
- Introduction to lasers and optical amplifiers, Basic concepts in photometry, radiometry, and calorimetry
- Light emitting diodes (LEDs), Semiconductor lasers, Optical detectors and receivers, Optical amplifiers, Ultrafast optoelectronics, Organic light emitting devices.*9+++-+

**COURSE TITLE:** Microwave Electronics
**COURSE CODE:** ECT-413

- RF and Microwave frequencies and technology, Passive microwave components: resistors, capacitors and inductors at RF and microwave frequencies.
- Transmission lines: coaxial lines, strip line, Slot line, coplanar line, and suspended-substrate strip line; Waveguides and its types (rectangular and circular etc.), Analysis and optimization of transmission lines.
- Impedance matching, Standing Wave Ratio (SWR), reflection loss, impedance matching on Smith chart, Passive microwave devices and circuits: directional couplers, isolators, circulators, resonant circuits, passive filter design, microwave mixers and detectors, Transceiver architectures.

**COURSE TITLE:** Computer Architecture
**COURSE CODE:** ECT-414

- Difference between architecture & organization, Introduction to Flynn’s classification of Computer Architecture (SISD, SIMD, MISD, MIMD systems), Performance metrics of CPU (MIPS and Mega-Flops).
- Overview of main computer architectures (SAP-1), CPU architecture, functional blocks and development of instruction set, design of basic functional blocks (PC, IR, CU, ALU etc.).
- Introduction to superscalar processors (CISC, RISC), cache memory, different designs of cache memory system, virtual memory system, address mapping using pages, pipelining and threading, instruction level parallelism (ILP), introduction to parallel processing. Branch prediction, pre-fetching, multithreading.

**COURSE TITLE:** Robotics Technology
**COURSE CODE:** ECT-415

- Fundamental of robotics, Classification of robotic systems, Robot anatomy and related attributes: Degree of freedom, types of joints/links, common robot configurations.
- Kinematics of serial robots, screw-based mechanics, Robot control system: Fundamentals of robot controllers, including analysis and design tools.

- Robot components, robot characteristics, robot languages, and robotic applications, Common robot sensors and actuators knowledge

**COURSE TITLE:** Digital Signal Processing
**COURSE CODE:** ECT-416

- Overview of basic concepts of Signals and Systems, Applications of DSP, Analog to Digital Signal Conversion, Nyquist Rate Sampling, Aliasing, Quantization.
- Correlation, Auto-Correlation, Introduction to Fast Fourier Transform, Introduction to Z-Transform, Properties of Z-Transform, Inverse Z- Transform.
- Digital Filters and their Applications, Digital Filter Design by Pole Zero Placement Method, Design of FIR Filters, Design of IIR Filters

**COURSE TITLE:** Renewable Energy
**COURSE CODE:** ECT-417

- Introduction to Renewable Energy: energy and society, types of renewable energy, advantages and disadvantages, energy and power.
- Solar Energy: introduction, sources and uses, solar thermal electricity, concentrating solar power, solar thermal Molten salt technology, Photovoltaic cell materials, Principle of photovoltaic, conversion of solar energy.
- Gasification technology, pyrolysis technology, biodiesel technology, biomass into ethanol, waste to energy, recent advances and applications of bioenergy technology. Geothermal energy: introduction, resource, types of geothermal resource, heat pumps, geothermal electricity, applications.

**COURSE TITLE:** Nanotechnology
**COURSE CODE:** ECT-326

- Nanoscale science and nanotechnology are broad, interdisciplinary areas, encompassing not just materials science but everything from biochemistry to electrical engineering and more.
- This will be a survey course introducing some of the fundamental principles behind nanotechnology and nanomaterials, as well as applications of nanotechnology.
- The role of solid-state physics and chemistry in nanotech will be emphasized. Nanoscale tools such as surface probe and atomic force microscopy, nanolithography, and special topics such as molecular electronics will also be covered.

**COURSE TITLE:** Professional Ethics
**COURSE CODE:** ECS-121

- Introduction to ethics, personal and professional ethics, the nature of engineering ethics; legal, professional and historical definitions; origin of professional ethics, profession and professionalism.
- Professional accountability, professional success, professional risks, professional associations; benefits of acting ethically and consequences of acting unethically.
- Value of Ethics: Values in professional ethics, central responsibility of engineering professionals, ethics in different fields of work, ethics in manufacturing and marketing, intellectual property rights, business ethics and corporate governance.

**COURSE TITLE:** Organizational Behavior
**COURSE CODE:** ECS-212

- Overview, Introduction to the field of organizational behaviour, motivation, Individual and group behaviour, Personality and values, Perceiving ourselves and others in organizations,
- Workplace emotions, Attitudes, and stress foundations of employee motivation, Applied performance practices, Decision making and creativity,
- Team dynamics, Communicating in organizations, Power and politics in the workplace, Conflict and negotiation in the workplace, Leadership in organizational settings.

**COURSE TITLE:** Critical Thinking
**COURSE CODE:** ECS-321

- Understanding Critical Thinking: What is Critical Thinking, Characteristics of a Critical Thinker, Common Critical Thinking Styles Making Connections, Left- and Right-Brain Thinking, and Whole-Brain Thinking
- The Critical Thinking Process: The Critical Thinking Model, the Standards of Critical Thinking, Identifying the Issues, Identifying the Arguments, Clarifying the Issues and Arguments, Establishing Context
- Making Connections, Creative Thinking Techniques: Brainstorming, imagining the opposite, Mind mapping, DeBono's thinking Hats, Techniques for Thinking Creatively, Creative Thinking Exercise, Presenting and communicating your ideas to others.

**COURSE TITLE:** Professional Psychology and Human Behavior
**COURSE CODE:** ECS-322

- Understanding Psychology: Scientific perspective of Psychology, Historical perspective, Schools of psychology, Methods of psychology, Ethical issues, Fields of psychology and their application
- Learning: Definition of learning, Types of learning: Classical and operant conditioning, Punishment and its effects, Latent and observational learning.
- Physiological changes during Emotions (Neural, Cardial, Visceral, Glandular), Theories of emotion, Social Thinking and Social Influence: Definition and nature of thinking, Tools of thinking, kinds of thinking, Social facilitation, Attribution theory, Crowd behaviour, Conformity, Obedience, Helping behaviour

**COURSE TITLE:** Fundamentals of Economics
**COURSE CODE:** ECM-121

- Basic concepts, technological economy defined Types of Business organizations, financial statements and financial ratios, Time value of money, cash flow series and its types, basic cost concepts. Profit and interest, discrete and continuous compounding, nominal and effective interest rate.
- Economic analysis of alternatives, Alternatives having identical lives, Alternatives having different lives, PW, AW, FW, Cost-benefit analysis and rate of return analysis, Break-even and payback analysis.
- Price, Supply and Demand Relationship. Project financing. Factors of production, Capital budgeting, economic analysis in the service sector.

**COURSE TITLE:** Entrepreneurship
**COURSE CODE:** ECM-122

- The concept of entrepreneurship, the economist view of entrepreneurship, the sociologist view, Behavioral approach, Entrepreneurship and Management.
- The innovation concepts, Importance of innovation for entrepreneurship, Sources of innovative opportunities, the innovation process, Risks involved in innovation. Entrepreneurial profile, Trait approach to understanding entrepreneurship, Factors influencing entrepreneurship
- Role of entrepreneur in the economic development generation of services, Employment creation and training, Ideas, knowledge and skill development, The Japanese experience, Case Studies of Successful Entrepreneurs

**COURSE TITLE:** Project Management
**COURSE CODE:** ECM-311

- Introduction to Management, History of management, functions and functional areas of management, Introduction to Project Management, Project Quality Management.
- Project Stakeholder Management, Project Cost Estimating and Budgeting, Project Risk Management.
- Project Time Management, Project Management Tools, Introduction and use of project management tools like MS project and primavera, Emerging trends in project management, Six Sigma Project Management Tools

**COURSE TITLE:** Principles of Marketing
**COURSE CODE:** ECM-411

- Introduction to Marketing: What is Marketing, understanding marketplace and customer needs, Customer driven marketing strategy, preparing marketing plan and capturing customer value, changing landscape of marketing.
- Understanding Market and Customer, Making Product the Brand- creating value, Pricing – understanding and capturing value
- Marketing Channel – delivering customer value , Promotion – Communicating customer value Creating Competitive Advantage: Competitor analysis whom to attack and avoid and competitive strategies.