K L U First year courses & syllabi

2011-2012 Batch Onwards

Common subjects for all braches of First Semester						
S No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	11HS1001	English	2	0	2	**3**
2	11HS1004	Energy&Society	3	0	0	**3**
3	11BS1001	Engineering Mathematics	3	1	0	**4**
4	11BS1004	Engg Physics	3	0	2	**4**
			11	**1**	**4**	**14**

Common subjects for all braches of Second Semester						
S No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	11HS1002	Technical Communication	2	0	2	**3**
2	11BS1002	Advanced Engineering Mathematics	3	0	2	**4**
3	11ES1001	Measurements	3	0	2	**4**
6	11ES1002	Engineering Materials	3	0	0	**3**
7	11PR1001	Mini Project - 1	0	0	2	**1**
			11	**0**	**8**	**15**

First Semester (CE/ME/EEE/EC/BT) + Second Semester (ECE & CSE)						
S No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
4	11BS1003	Engineering Chemistry	3	0	2	**4**
5	11HS1003	Ecology and Environment	2	0	0	**2**
7	11ES1003	Engineering Graphics with CAD	0	0	4	**2**
			5	**0**	**6**	**8**

First Semester (ECE & CSE) + Second Semester (CE/ME/EEE/EC/BT)						
S No	**Course Code**	**Course Title**	**L**	**T**	**P**	**Credits**
5	11ES1004	Problem Solving through Programming	3	0	2	**4**
6	11ES1005	Workshop Practice	0	0	4	**2**
			3	**0**	**6**	**6**

*Mathematics – I and Biology for Bio-Technology

Engineering Mathematics Credits: 3:1:0

Aim: The aim of this course is to model a wide range of engineering problems as ordinary differential equations and generate closed form solutions in time domain directly, and through Laplace transform methods, and for a system differential equations using Matrix methods.

Program Outcomes (Washington Accord) addressed

1. Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

10. Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development.

Competencies: At the end of the course the students should be able to

C1 Formulate differential equations for given families of curves

C2 Solve linear and non-linear differential equations using methods including variable separable, exact differential, and variation of parameters.

C3 Model as differential equations phenomena including Newton's law of cooling, Growth and decay, Chemical reactions, L-R, C-R and LCR circuits, and mechanical vibrating string

C4 Determine the Laplace transform of given functions

C5 Solve linear differential equations using Laplace transforms

C6 Perform elementary operations on matrices including determination of rank and inverse

C7 Test the consistency and then solve a system of linear homogeneous and non-homogeneous equations using rank of a matrix

C8 Determine the stability of a given linear system described by a system of linear first order differential equations

Syllabus

Ordinary Differential Equations of First Order: Nature of ordinary differential equations, Modeling engineering systems as differential equations, Solution methods, Applications to law of natural growth and decay problems, Newton's law of cooling, Chemical Reactions and Solutions, Orthogonal Trajectories, Linear Equations and Non- Linear Equations, R-L circuits with step unit, R-L Circuits with input.

Ordinary Differential Equations of Second Order: Formulation, s, Modeling engineering systems as second order ODEConversion of some models to Differential Equations of second and higher order, Homogeneous equations (Complementary Function), Non- Homogenous equations (Particular Integral).

Applications of Second and Higher Order ODEs: Cauchy's linear equation, Legendre's linear equation, Method of variation of parameters, Solving system of simultaneous Ordinary differential equations. L-C-R Circuits with and without e.m.f., Oscillations of a spring without damping and with damping, Oscillation and deflection of beams.

Laplace Transforms: Laplace transforms of some standard functions, properties of Laplace transforms - Linearity, First Shifting Property, Change of Scale Property, Transforms of derivatives, Integrals multiplication by t^n, division by t, Inverse Laplace transforms, Convolution theorem, transforms of periodic functions and Unit-Step function. Applications: Solving ODE using Laplace transforms method.

Matrices: Rank of a Matrix, Solving system of equations by using rank method, Linear independence and dependence of a set of vectors, Eigen values and eigen vectors, Stability of the system by eigen values, Orthogonality of eigen vectors, Cayley-Hamilton theorem and its applications, Complex matrices, Quadratic forms and canonical forms, Nature of Quadratic forms, Diagonalization .Dynamical systems: State variables, State vector, State space formation of OCF, CCF, Solution of homogeneous and non-homogeneous state equations.

Text Books:

1. Advanced Engineering Mathematics by Michael D. Greenberg, Pearson Education, 4 Edn., 2008.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers., 40th edition, New Delhi.

References:

1. Control Systems theory and application by Smarajit Ghosh, Pearson education, 2009. (Chapter17, pp:498-522).
2. Advanced Engineering Mathematics by Ervin Kreyszig
3. Advance Engineering Mathematics by Wyli and Barret.
4. Higher Engineering Mathematics by B.V. Ramana, Mc.Grew Hill Co., 2010.
5. Engineering Mathematics, by Anthony Croft, Robert Davison, Martin Hargreaves, Pearson education, 3 Edn., 2009

Engineering Physics **Credits**: **3:0:1**

Aim: This course explores the fundamental concepts and principles of Physics from areas including wave optics, ultrasonics, electromagnetism, optoelectronics and superconductivity from engineering perspective.

Program Outcomes (Washington Accord) addressed:

1. Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.
2. Identify, formulate, research literature and solve *complex* engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
3. Design solutions for *complex* engineering problems and *design* systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

Competencies: At the end of the course the student should be able to

C 1 Calculate the resultant amplitude and intensity when two or more light waves get superimposed.

C 2 Derive the conditions for interference maxima and minima.

C 3 Explain the production of plane polarized light using different techniques and to detect different types of polarized lights.

C 4 Explain how ultrasonic waves are produced and detected.

C 5 Determine flaws present inside a material using NDT techniques.

C 6 Compute the electric field by Gauss's Law.

C 7 Compute the magnetic induction produced by current carrying conductors by using Biot-Savart law and Ampere's law.

C 8 Compute the Lorentz force experienced by a charged particle.

C 9 Determine resonance frequency and Q factor of RLC circuits.

C 10 Compute motional emf and transformer emf and formulate Maxwell's equation for time varying fields.

C 11 Understand bonding in semiconductors and working of PN junction diode.

C 12 Explain the working of optoelectronic devices including LED, LCD and solar cells.

C 13 Explain the phenomenon of superconductivity.

C 14 Describe the elements of laser system.

Syllabus:

Wave Optics: Interference: Principle of superposition, interference, conditions for maxima and minima, Interference in thin films (reflected and transmitted lights); Interference in thin wedge shaped film, Newton's rings determination of wavelength. **Polarization:** Differences between un-polarized light and polarized light , representation of polarized light (Brewster's law), polarization by reflection, polarization by double refraction, Nicol's prism, concept of QWP and HWP, superposition of o – ray and e – ray and concept of CPL and EPL.

Ultrasonics: Properties, production – Magnetostriction, Piezoelectric methods, detection – piezoelectric detector, acoustic grating, Kundt's tube method. Applications – Industrial (drilling, welding, soldering, cleaning, SONAR, NDT (pulse echo, transmission, resonance technique), Medical (echo cardiogram, ultrasonic imaging).

Electromagnetism: Electrostatics**:** Coulomb's law (vector form), definition of electric field for a point charge, concept of electric flux, flux density, statement of Gauss's law (no proof). Applications of Gauss's law - line of charge, sheet of charge, spherical charge distribution (solid sphere and spherical shell). **Magnetostatics:** Magnetic force on a moving charge, Lorentz force equation, applications, Cyclotron, Hall Effect, Biot-Savart's law, B due to straight conductor carrying current, and circular loop, Ampere's law and applications- straight conductor carrying current, magnetic flux, Gauss's law of magnetostatics, Maxwell's equations (statement only) for static fields, LCR series resonant circuit. **Electrodynamics:** Faraday's laws with experiments, Lenz's law, motional e.m.f, and transformer e.m.f. with examples, induced electric fields, concept of displacement current, Maxwell's equations (statement only) for time varying fields. **SEMICONDUCTOR PHYSICS:** Types of solids – conductors, semiconductors, insulators; bonding in semiconductors; types of semiconductors; construction and working of PN junction diode.

Opto Electronics: Photo electric effect, light emitters – LED; light detectors – Photo diode, Photo transistor; solar cells – principle, fabrication and its applications. **Lasers:** Characteristics, stimulated & spontaneous emission, population inversion, metastable states, pumping mechanisms, Ruby, He:Ne, GaAs lasers, application of lasers in engineering & medicine.

Superconductivity: Introduction, properties, Experimental facts – resistance Vs temperature, Meissner effect, Josephson Effect, critical parameters, type I and II superconductors, HTS, applications.

Text Books:

1. Physics Volume II 5th Edition, Resnick, Halliday and Krane.
2. Engineering Physics, 2nd edition, P. K Palanisamy, Sci Tech publications (India) Pvt.Ltd, Chennai.

Reference Books:

1. University Physics, 6th edition, Francis W.Sears, Mark W Zemansky, Hugh D Young, Norsa Publishing House.
2. Solid State Physics, 6th Edition, S.O. Pillai, Newage International Publishers.
3. Optics, 2nd Edition by Ajay Ghatak, Tata Mc Grahill Publications
4. Applied Physics, P.K. Palanisamy, Scitech publications (India) Pvt.Ltd, Chennai.
5. Engineering Physics, 8th Edition, R K Gaur and S L Gupta, Dhanpat Rai Publications.

Course: **Engineering Chemistry** **3:0:1**

Aim of the course: This course will involve minimum lecturing, content will be delivered through assigned reading and reinforced with large and small group discussions, as well as assigned in class (and occasional out of class) group activities. Water and its treatment for various purposes, engineering materials such as plastics, composites, abrasives, their preparation, properties and applications, various batteries, corrosion and control of metallic materials and application of phase rule to water system & Pb-Ag system..

Competencies:

	Competency
C 1	Determine the quality of water from different sources.
C 2	Explain the effects of using untreated water for drinking and industrial use, and the treatment processes for making water from a given source suitable for drinking and industrial use.
C 3	Select a suitable polymeric material for a given application.
C 4	Understand the classification, properties and applications of materials used as abrasives, composites and conducting polymers.
C 5	Understand the concepts of cell, electrode, cathode, anode, electrolysis, electromotive force and reference electrode.
C 6	Explain construction, working and applications of batteries.
C 7	Understand atmospheric corrosion, electrochemical corrosion.
C 8	Explain how metallic objects can be protected from corrosion under different environments.
C 9	Apply Gibb's rule, tie line and liver rule to different phase diagrams.
C 10	Describe cooling curves and phase diagrams.

Syllabus:

Water Technology: Sources, impurities, hardness, types of hardness, estimation of hardness by EDTA, alkalinity – numericals, ill effects of water in steam generation, preventive measures - internal and external treatments (cold and hot lime soda processes, numericals and ion exchange process), Quality standards and treatment for drinking water desalination methods: Electrodialysis and reverse osmosis. **Polymers:** Polymers – definition - polymerisation – types - addition and condensation polymerization-free radical and coordination polymerisation mechanisms – plastics, classification – preparation, properties and uses of PVC, Teflon, Bakelite, UF resin and PET. Chemistry and applications of conducting polymers (poly acetylene and poly aniline), FRP composites and abrasives – classification, properties and uses.

Electrochemical energy systems: Basics, electrode potential, emf of a cell, reference electrodes (calomel, glass), determination of pH. Concentration cell. **Conversion and storage** of electrochemical energy: Zn-C dry cell, lead acid, nickel-cadmium, Lithium cells. Chemistry of H_2, H_2-O_2 fuel cell, future water powered car and solar cell. **Corrosion Science:** Definition, atmospheric corrosion-mechanism, electrochemical corrosion-mechanism, microscopic galvanic cell corrosion, concentration galvanic cells, galvanic cells created by differences in composition, structure and stress, factors affecting corrosion, Corrosion control-material selection, design, alteration of environment, cathodic and anodic protection, Electroplating of Cu. **Phase Rule**: Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic system (Pb-Ag). .

Text book:

1. Chemistry in Engineering and Technology**,** Volume 2, J C Kuriacose & J Rajaram, The Tata McGraw Hill, New Delhi.
2. A text book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co. New Delhi.

Reference Books:

1. Engineering Chemistry, O G Palanna, The Tata McGraw Hill, New Delhi.
2. Engineering Chemistry, B. Sivasankar, The Tata McGraw Hill, New Delhi.
3. Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing Company. New Delhi.
4. Engineering Chemistry, C Parameswara Murthy, C V Agarwal and Andra Naidu, B S Publications, Hyderabad.

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Advanced Engineering Mathematics Credits: 3:0:1

Aim: The aim of this course is to study functions of several variables including real and complex variables.

Competencies: At the end of the course the students should be able to

C1 Formulate and solve problems of engineering dynamics using different differential operators.

C2 Formulate the problem of computing areas and volumes through vector integration, and determine them by applying Green, Stokes and Divergence theorems

C3 Determine maxim and minima of functions of several variables using analytical and Lagrangian multipliers methods

C4 Determine the values of multiple integrals directly or by changing the order of integration or by making transformation with Jacobians.

C5 Determine areas and volumes of geometrical figures using multiple integrals, beta and gamma functions.

C6 Determine the recurrence relations of Bessel's and Lagrange's Polynomials.

C7 Analyze functions of complex variable in terms of continuity, differentiability and analyticity.

C8 Apply Cauchy-Riemann equations and harmonic functions to problems of fluid mechanics, thermodynamics and electro-magnetic fields.

C9 Determine the singularities and poles of complex functions

Syllabus

Functions of Several Variables: Partial derivatives and Jacobians, Total differentiation and applications, Lagrangian Multiplier method, Applications to Maxima and Minima.

Multiple Integrals: Double integrals and areas, Triple integrals and volumes, Change of order of integration, Change of variables between Cartesian and polar with applications.

Special Functions: Beta and Gamma functions with applications, Bessel's, Legendre differential equations, recurrence relations, orthogonality, generating functions.

Vector calculus: Vector Differentiation with simple applications, Operators Grad, div and curl with properties, applications to Physics, Vector Integration(three famous theorems without proof), Applications to areas and volumes

Complex Differentiation and Integration: Analytic functions, C-R equations (without derivations) and properties, Harmonic Functions and Milne-Thompson Method, Applications to flow problems, Cauchy's theorem and consequences, Evaluating integrals using Cauchy's integral formula, Taylor and Laurent expansions(without proof), Singularities, poles and Cauchy residue theorem.

Text Books:

3. Advanced Engineering Mathematics by Michael D. Greenberg, Pearson Education 4 e, 2008.
4. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers., 40th edition, New Delhi.

References:

6. Control Systems theory and application by Smarajit Ghosh, Pearson education, 2009. (Chapter17,pp:498-522).
7. Advanced Engineering Mathematics by Ervin kreyszig
8. Advance Engineering Mathematics by Wyli and Barret.
9. Higher Engineering Mathematics by B.V. Ramana, McGraw Hill Co., 2010.
10. Engineering Mathematics, by Anthony Croft, Robert Davison, Martin Hargreaves, Pearson education, 3 edn., 2009

Engineering Graphics with CAD Credits: 0:0:4

Aim: The primary aim of this course is to enable students to create engineering drawings of mechanical parts using Autocad for communication among designers and production

Program Outcomes (Washington Accord) addressed

1. Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.
2. Identify, formulate, research literature and solve *complex* engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
5. Create, select and apply appropriate techniques, resources, and modern engineering tools, including prediction and modeling, to *complex* engineering activities, with an understanding of the limitations.
7. Communicate effectively on *complex* engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
9. Understand and commit to professional ethics and responsibilities and norms of engineering practice.

Competencies: At the end of the course the student should be able to

C 1 Understand the concepts of hidden lines for invisible surfaces, first angle projection and third angle projection

C 2 Demonstrate proper use of AutoCAD software

C 3 Draw the orthographic projections for a given isometric drawing

C 4 Draw the isometric drawing for a given orthographic projections

C 5 Determine the distance and angle between any two objects

C 6 Draw the projection of planes in any position

C 7 Draw the projection of solid in any position

C 8 Explain the spatial relation between the observer, object and the projection plane

Syllabus:

Introduction to Computer Aided Drafting, AutoCAD Commands, Types of lines, Dimensioning, Theory of Projection – Elements of projection, planes of projection, methods of projection

Projection of Points and Straight Lines – Projection of points, projections of straight lines, various positions of straight lines w.r.t. reference planes, traces of lines.

Projection of Planes – Types of planes, projection of planes, various positions of planes w.r.t reference plnes (Use First angle method of projection)

Projection of Solids – Types of solids, projection of solids in simple position, projection of solids with axis inclined to one reference plane and parallel to other. (Use First angle method of projection)

Orthographic Projection –Introduction to Orthographic projections, types of surfaces, invisible lines, precedence of lines, steps to draw orthographic views, orthographic projection of different objects. (Use First angle method of projection)

Isometric projection – Theory of isometric projection, isometric view, isometric views from orthographic views for simple objects

Text Books:

1. Engineering Graphics with AutoCAD by D. M. Kulkarni, A. P. Rastogi, and A.K. Sarkar; PHI Learning Private Limited, New Delhi, 2009

Reference books:

1. Engineering Drawing By N.D. Bhatt

Workshop Practice **Credits**: **0:0:4**

Aim: The aim of the course is to enable the students to be able to understand the production of simple mechanical components and products and produce them in a workshop

Program Outcomes (Washington Accord) addressed:

1. Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.
3. Design solutions for *complex* engineering problems and *design* systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. Conduct investigations of *complex* problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
5. Create, select and apply appropriate techniques, resources, and modern engineering tools, including prediction and modeling, to *complex* engineering activities, with an understanding of the limitations.
6. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
7. Communicate effectively on *complex* engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
8. Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
9. Understand and commit to professional ethics and responsibilities and norms of engineering practice.
10. Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development.
11. Demonstrate a knowledge and understanding of management and business practices, such as risk and change management, and understand their limitations.
12. Recognize the need for, and have the ability to engage in independent and life-long learning.

Competencies: At the end of the course the student should be able to

C1 Sketch and label schematic diagrams of machines including lathe, drilling machine, shaping machine, milling machine welding unit, sand casting

C2 Explain the operation of machines including lathe, drilling machine, shaping machine, milling machine welding unit, sand casting

C3 Determine the operations involved and their sequence in producing a component as per the drawing and produce the component

C4 Check the quality of given components and/or products

C5 Assess the economic implications of the production procedures employed in producing a component and/or product

C6 Select the most suitable production and measurement processes to produce a component and/or product

C7 Design the production process for a given product.

Syllabus:

Introduction, Safety Rules and Regulations, First Aid Practice

Carpentry – Hands on practice of Wood working operations using hand tools including Lap Joint, Lap Tee Joint, Dove Tail Joint. Demonstration of wood turning on lathes

Welding – Hands on practice of Joining of metal parts by Arc Welding including Butt Joint, Lap Joint. Demonstration of Gas Welding

Sheet Metal Working - Hands on practice of Sheet metal working operations using hand tools including Plane pipe, Funnel, Rectangular/Triangular Tray

Electrical Wiring – Hands on practice of House Wiring connections including one lamp control by single SPT switch, one lamp control by two double DPT switches, Socket control by switch, Fluorescent lamp control.

Machining – Demonstration of Turning, Milling, Shaping, Drilling, and Grinding operations

Casting – Demonstration of sand casting process

Forging – Demonstration of forging operations

Economical aspects in production – Classification of costs involved in manufacturing, estimation of production time and tool life, Break-Even analysis

Text Book:

1. B. S. Nagendra Parashar, “Elements of Manufacturing Processes”, Prentice Hall India, New Delhi.

2. “Workshop Practice - Laboratory Notes”, K L University, Guntur

Ecology and Environment Credits: 2:0:0

Aim: The primary aim of this course is to enable students to understand the importance of conservation of natural recourses and causes, effects and controlling measures for various environmental problems.

Program Outcomes (Washington Accord) addressed:

	Program Outcome
3.	Design solutions for *complex* engineering problems and *design* systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
6.	Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
8.	Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.
9.	Understand and commit to professional ethics and responsibilities and norms of engineering practice.
12.	Recognize the need for, and have the ability to engage in independent and life-long learning.

Competencies: At the end of the course the student should be able to

	Competency
C 1	Understand the scope, importance and multi disciplinary nature of Environment
C 2	Reasons for the over exploitation of natural resources and need of the renewable energy resources
C 3	Understand the energy flow and transfer of food material from producers to herbivores and carnivores in an Ecosystem
C 4	Know the importance of biodiversity and its conservation
C 5	Understand how our planet earth getting damaged due developmental activities.
C 6	Understand and implement how the nature can be reinstated by adopting Eco Friendly techniques

Syllabus:

The Multidisciplinary nature of Environmental Studies and Natural Resources: Scope, importance, Need for public awareness, Institutions and people in Environment.

Natural Resources: **Forest resources**: Forest distribution, importance of forests, causes, effects and control of deforestation. **Water resources:** Nature of water resources, floods, drought, conflicts over water, dams- benefits and problems, **Water conservation,** rain water harvesting, watershed management. **Mineral resources**: Environmental effects of mining. **Food resources:** World food problems, effects of modern agriculture, water logging, salinity. **Energy resources:** Growing energy needs, Renewable and non renewable energy sources. **Land resources:** land degradation, Soil erosion and desertification. Case studies, Role of an individual in conservation of natural resources.

Ecosystems: Structure and function of an ecosystem, Energy flow, ecological pyramids, Types of ecosystem, Ecological succession.

Biodiversity and its Conservation: Levels and Values of biodiversity, India as a mega diversity nation, Hotspots, threats and conservation of biodiversity, Assessment of Biodiversity and its impact on Environment, Case studies

Environnemental Pollution: Pollution, Causes, effects and control of pollutions, Soil waste management, Role of an individual in prevention of pollution - Pollution case studies. **Disaster management:** Floods, cyclones, Earth quacks, landslides, disaster reduction management.

Text Book:

1. Erach Bharucha, 2010 “Text Book of Environmental Studies”, United Grants Commission, Universities Press (India) Pvt Ltd., Hyderabad.

Reference Books:

1. Anubha Kaushik, C.P. Kaushik, 2007 Environmental Studies, New Age International
2. Benny Joseph,2009 Environmental Studies, The McGraw-Hill companies, New Delhi
3. Mukkanti, K. 2010. Environmental Studies, S.Chand & company, New Delhi
4. P. Ananadam and R. Kumaravelam, Environmental Science and Engineering, SciTech Publications India, Chennai

Problem solving through programming Credits: 3.0:2

Aim: The course is to make the students learn problem solving by writing algorithms, flowcharts and coding them in C language. The course helps the students to write programs for solve Mathematical and Engineering problems. The course also helps the students to prepare for placement tests and face interviews for software jobs.

Program Outcome (Washington Accord) addressed:

1.Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

2. Identify, formulate, research literature and solve *complex* engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.

4. Conduct investigations of *complex* problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

5. Create, select and apply appropriate techniques, resources, and modern engineering tools, including prediction and modeling, to *complex* engineering activities, with an understanding of the limitations

6. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

12. Recognize the need for, and have the ability to engage in independent and life-long learning.

Competencies: At the end of the course the student should be able to

C 1 Student must remember the syntax of different I/O functions ,format specifications , different data types and their usage

C 2 Remember different types of operators precedence & associability. Apply them to write arithmetic relational, logical, increment, decrement , assignment, & conditional expressions which are required in writing programs.

C 3 Student must remember the syntax of Control Structures (if-else, while, do – while, for, switch,

Continue , goto).Must understand their usage and write programs based on selection & repetition of blocks of statements.

C 4 Student must understand the allocation of memory for Arrays (I & II dimensional) and storing data. Student must use these to write programs for sorting ,searching matrix operations and string manipulations

C 5 Student must learn the structure of C function and different forms . Student must be able to write multi function program based on pass by value pass by reference concepts .Also learn how to pass arrays to functions through arguments.

C 6 Student must be able to define structure data types and use them in simple data processing applications Also he must be able to use the concept of array of structures .

C 7 Student must understand the concept of pointers , declarations , initialization operations on pointers and their usage and advantage in handling I &II dimensional arrays and strings.

C 8 Student must be able to apply malloc, calloc, realloc and free functions for Dynamic Memory allocation. Also, he must be able to know the advantage of this over static memory allocation

C 9 Student must be able to learn opening of data files and learn input/ output file data input /output. Also he must learn to write programs for reading, writing and appending data to sequential data Files

Syllabus:

Character set, Integers, Floating point, Boolean, Pointer data types, Declaration, Introduction to Formatted input and output.Assignment, Arithmetic operators, Implicit type conversions, Precedence and associatively of operators, Relational, Logical, Compound assignment, Increment and Decrement, Cast and conditional operators.

Flow charts for Algorithm Development, simple and compound statements, Null and Expression statements, Selection statements, Repetition statements, Jump statements.

Function Definition, Function prototypes, calling functions, Standard C Header files and libraries, Mathematical functions, Recursive functions, Global and local variables, Storage classes. Formatting output for functions in the printf() family, Formatting input for functions in the scanf() family.

Character Code, Character input and output, character handling functions, Stings, string input and output, The continuation character, string manipulation-length, copy, append, compare. Structures, Enumerations, unions.

Declaration of Arrays, Processing Data in Arrays, Passing Arrays to Functions, Introduction to Vectors and Matrices.Pointer variables, pointer Arithmetic, calling functions by Reference using pointers, Relation between pointers and arrays, using pointers to pass One-Dimensional arrays to functions, Dynamic Allocation of Memory, Functions Returning pointers, Array of pointers.

Opening and closing files, reading and writing sequential files.

Text Book:

1. C for Engineers and Scientists – An Intepretive Approach by Harry H.Cheng, Mc Graw. Hill International Edition 2010.
2. Programming in ANSI C – E.Balaguruswamy TMH

Reference Books:

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F.Gilberg, Third edition, Thomson.
2. C Programming with problem solving-J.A.Jones and K.Harrow, Dreamtech Press.
3. The C Programming Language- B.W.Kernighan, Dennis M.Ritchie, PHI/Pearson Education.
4. Programming in C Kochan 3rd Edition Pearson Education.

Energy & Society Credits: 3.0:0

Aim: The course is designed to enable a student to appreciated the diverse aspects of energy and its impact on all the societal system.

Program Outcome (Washington Accord) addressed:

1. Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

2. Identify, formulate, research literature and solve *complex* engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.

3. Design solutions for *complex* engineering problems and *design* systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. Conduct investigations of *complex* problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

6. Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

8. Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice.

10. Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development.

12. Recognize the need for, and have the ability to engage in independent and life-long learning.

Competencies: At the end of the course the student should be able to

C 1 Understand the social, techno-economic, environmental and institutional aspect of energy.

C 2 Understand renewable and non-renewable energy supply chain how energy and quality of life are related.

C 3 Determine the cost and performance of energy chains

C 4 Determine how end users consume energy

C 5 Determine the impact of energy access on quality of life in rural and urban areas

C 6 Determine the impact of energy on environment

C 7 Understand how energy systems are planned, managed and controlled at present

C 8 Understand how energy has affected the history of the world

C 9 Conduct an energy audit of an institution

Syllabus:

Energy definition, techno, economical, environmental and institutional aspects of energy, relationship with quality of life. Different forms of energy, renewable and non-renewable energy, modern forms of energy supply chains, cost and performance of energy chains, hidden costs of energy, energy efficiency, overall efficiency of a energy chain, end use technology.

Energy usage, quality of life in rural and urban areas, population demographics, economic poverty and energy poverty, impact of energy on environment, concepts of climate changes and its impacts ,Ecological foot prints of an individual , a family, an organization and a region. Sustainable development issues, energy usage with respect to sustainable development.

Energy systems: past, present and future, management, planning and controlling, Integrated energy planning, role of institutions in managing, the economic and industrial activity effect on energy systems.

Energy audit, principles of energy auditing, basics of energy estimation, energy audit and energy reporting process, case study: the energy audit of an institution.

Learning Material

1. Notes will be made available

Reference Books:

1. Energy, 1994 Aubrecht, Gorden J, Prentice Hall

2. Energy for sustainable World, Goldberg, 1998, J, Johnson H, Reddy AKR, and Williams R, Wiley Eatern
3. Energy for the 21st century, A comprehensive guide in conventional and alternative sources, 2006, Roy L. Nersesian, M. E.Sharpe.
4. Renewable Energy : power for sustainable features, 2004, Godfrey Boyle, Oxferd University Press.
5. Energy, Resources and the long term feature, 2007, Avery, John Scales, World Scientific New Jersey.

Measurements Credits: 3-0-2

Aim: This course covers experimental methods for undergraduate students and provides an exposure to broad range of Instruments and experimental measurement technique. This course not only limits to problem solving, but also stresses the importance of accuracy, error, and uncertainty in faulty experimental measurement

Program Outcome (Washington Accord) addressed:

1. Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

2. Identify, formulate, research literature and solve *complex* engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.

3. Design solutions for *complex* engineering problems and *design* systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

4. Conduct investigations of *complex* problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

Competencies: At the end of the course the student should be able to

C .1 Understand the basic terminology of measurements namely calibration, standards, dimensions, and units, errors/distortion and system response

C.2 measure electrical parameters like voltage, current, power, power factor, phase, Resistance, inductance, and capacitance

C.3 know about ranges and applications of various meters

C.4 know about different types of transducers and their applications

C.5 Student is able to measure displacement, pressure, using different meters like U-tube manometer, mechanical gauges

C.6 know about flow measurement meters, like rotometer, etc

C.7 various principles of temperature measurement, and measuring temperature using electrical resistance, thermo couple etc

C.8 various types of stress and strain measurements, like electrical strain gauge, gauge factor, method of usage of resistance transducer, strain gauge for bending compressive and tensile stress,

C.9 know how to measure force, strain etc..

C.10 measure torque and force

SYLLABUS:

Fundamentals of Measurement :General terms of measurement, Calibration, Standards, Dimensions and units, Generalized measurement system ,basic concept in Dynamic measurements systems , System response ,Distortion, Causes and types of experimental errors, transducers, types of transducers

Basic electrical measurements and sensing devices: Measurement of current, voltage, power, power factor. Frequencies, phase, R, L, C measurements, ranges of various meters, various applications using their suitable transducers

Displacement and Pressure measurements: Dimensional measurement, Gage blocks, Optical methods, Pneumatic displacement gage, Pressure measurement, Dynamic response considerations, Mechanical pressure measurement devices, Dead weight tester , Bourdon-Tube Pressure gage, Diaphragm and bellows gages, The McLeod Gage,

Flow and Temperature measurement :Classification of flow measurement systems, Rota meter, Turbine flow meter, Hot wire anemometer, introduction to temperature measurement ,ranges, various principles of measurement, electrical resistance, Thermistors, Thermo couple, radiation pyrometers, Temperature indicators

Stress and strain measurements: Various types of stress and strain measurements, electrical strain gauge, gauge factor, method of usage of resistance strain gauge for bending , compressive , and tensile strains , usage for measuring torque, Strain gauge Rosettes, elastic elements for force measurement, torque measurement

Text Books:

1.) Experimental methods for Engineers By – J.P.Holman, The MCGraw-Hill, 7e.

References:-

1.) Electron measurements & Instruments By oliver & Cage.
2.) Electrical measurements & Instrumentation By – A.K.Sahani

ENGLISH Credits: 2:0:2

AIM :

This course aims at improving the communication skills of students and helps them recognize how technical writing plays a significant role in their education as well as careers in business, technical, and scientific domains.This course is poised to showcase the distinct advantages of possessing technical communication skills vis-à-vis the basic language skills in lexis, communicative grammar, and non-conventional composition skills like process descriptions and print media releases.

PROGRAMME OUTCOMES: (WASHINGTON ACCORD)

4. Students can use principles of thought processing taught to them in non-conventional writing skills as in sub-topics like "Writing descriptions and instructions". Hints like one should move from generic to specific information will be helpful in achieving clarity in analyzing or summing up information.

6. In Technical Communication Skills II, unit ii, students get to do a number of case studies on team work, styles of leadership, decision making, and empowerment. Cases are used for role play in lab sessions.

7. This is dealt with in detail in 2 units of English ,students are taught about the 8 types of reports and four common formats used frequently
a) Letter format b) Memo format c) Manuscript format d) Print format.
Briefing, giving and receiving instructions, and presentation skills are the other subtopics included in "Non-conventional written communication skills."

8. Some of these issues are touched upon in "Interpersonal and Intrapersonal Communication" and a reference is made to the Korean custom of drinking soup from a common bowl as an example of objectionable cultural practice..

11. Some of the concepts mentioned here are given in simple and interesting case studies taken from" Personal Development for Life and Work" by Wallace and Masters. The case studies are brief and simple and deal with a number of day-to-day situations and are ideal for single session presentation in the lab.

12. The skills imparted help the students meet the industry requirements on a day-to-day basis and also in their social and personal lives.

COMPETENCIES:

C 15 Identifying the terminology covering the various subject areas provide them the generic skill that helps to identify and comprehend the concepts and fundamentals of engineering process.

C 16 Introducing to students various languages registers used in professional world and helping them acquire a wide range of effective as well as appropriate written communication skills.

C 3 Developing an awareness of the linguistic and cultural differences that exist in the world through an interface of English vis-à-vis the respective vernacular.

C 4 Professional language usage has changed drastically in terms of space, need and 11^{th} hour necessities which have transformed the face of languages that facilitated the formation of congenial attitude to forge a fruitful, cultural and societal interaction.

C 5 Provides the student with all necessary mechanics that facilitate and enhance their written communication with professionals as well as general public.

C 6 Students develop the ability to clearly identify the requirement and the appropriate formats and styles of communication.

C 7 Cultivate the habit of reading for various purposes like reading for pleasure; reading for information etc. The main objective is to acquire the techniques of skimming and scanning.

SYLLABUS:

RECAP OF LANGUAGE SKILLS

- Basic Word list
- Antonyms
- Synonyms
- Analogies
- Eponyms
- One word substitutes

ENGLISH USAGE AND MECHANICS

Correction of Sentences

Sentence Completion (TOEFL level)

Jumbled Sentences

OFFICE COMMUNICATION

(i) Letter Writing:

- Formats of letter writing-Full block and semi-block models
- Types of letters- Formal and Informal letters
- Personal, Business, Sales, Collection, Regret Letters

(ii) Memo Writing

- Office Memos
- Routing Slips

(iii) Note Making and Note Taking

ENGLISH SKILLS FOR THE MEDIA

News Papers:

- Writing advertisement captions
- Writing headlines, punch lines, cut lines, tag lines
- Writing brites, blurbs
- Profiling, Briefing and Proofreading skills
- Catch Phrases
- Tabloides

READING SKILLS

- Reading Comprehension
- Reading for Information
- Reading for Specifics
- Skimming and Scanning.

Text Books:

1. Technical Communication (Mumbai University)
2. Objective English - Edgar Thorpe
   Cambridge English for the Media - Nick Carmelle

TECHNICAL COMMUNICATION SKILLS Credits: 2:0:2

AIM:

This course is poised to showcase the distinct advantages of having technical communication skills vis-à-vis the basic language skills in Lexis, communicative grammar, and non-conventional composition skills like process descriptions and print media releases.

PROGRAMME OUTCOMES: (WASHINGTON ACCORD)

4. Students can employ the principles of thought processing taught to them in non-conventional writing skills as in sub-topics like "Writing descriptions and instructions". Hints like one should move from generic to specific information will be helpful in achieving clarity in analyzing or summing up information.

6. In Technical Communication Skills , Unit ii, students get to do a number of case studies on team work, styles of leadership, decision making, and empowerment. Cases are used for role play in lab sessions.

7. This is dealt with in detail in 2 units of Technical English Communication Skills . Students learn to write 8 types of reports and four common formats used frequently --a) Letter format b) Memo format c) Manuscript format d) Print format. Briefing, giving and receiving instructions, and presentation skills are the other subtopics included in "Non-conventional written communication skills."

8. Some of these issues are touched upon in "Interpersonal and Intrapersonal communication" and a reference is made to the Korean custom of drinking soup from a common bowl as an example of objectionable cultural practice.

11. Some of the concepts mentioned here are given in simple and interesting case studies taken from" Personal Development for Life and Work" by Wallace and Masters. The case studies are brief and simple and deal with a number of day-to-day situations and are ideal for single session presentation in the lab.

12. The skills imparted help the students meet the industry requirements on a day-to-day basis and also in their social, personal life.

COMPETENCIES :

C1 Interpret and quickly respond to various non verbal cues.

C2 Understanding the elements of team and its components – Forming, Norming, & Storming etc

C3 Processing & sequencing of information and thoughts to achieve clarity in written communication

C4 Planning & organizing the habit of setting and meeting goals.

C5 Self – motivation that leads one to exhibit the readiness to handle problems with ease and élan

C6 Develop confidence and consistency by utilizing opportunities for seeking and expressing opinions.

C7 Identify different techniques, steps & methods to remedy a problem situation.

C8 Identify and anticipate consequences and adopt appropriate line of action.

C9 Evaluate every situation with a calm clear mind and judge with a perfect outlook.

C10 Recognize and appreciate factors that contribute to personal development through study of various social circumstances

SYLLABUS

Non Verbal Communication

- Appearance and Gait
- Facial Expressions
- Gestures and Postures
- Eye Contact
- Vocal Communication techniques.

Intrapersonal skills

- Self-Awareness
- Self-confidence
- Self-assertiveness
- Self-esteem
- Dealing with Emotions

Interpersonal Skills

- The team concept
- Elements of team work
- Stages of team formation
- Team player styles
- What is an effective team?

Business correspondence

- Writing circular letters
- Process description
- Writing manuals
- Pamphlets/brochures/handouts
- Guidelines for writing descriptions

Advanced grammar

- Parallelism
- Dangling, squinting modifiers
- Tautology
- Ambiguity
- Shifts in mood, voice and tense.

Composition skills

- Jumbled paragraphs
- Sentence sequence
- Précis writing

Critical Appreciation

- Thematic evaluation
- Style, attitude, point of view
- Short story excerpts
- Poems.

Text Books

- Business communication: Process and Product

  Mary Ellen Guffey
- Hand book of English grammar and usage

  Mark lester and Larry beason

Course: Engineering Materials Credits: 3:0:0

Course Aim: This course explores the fundamental principles, concepts and applications of materials for engineering applications.

Program Outcome (Washington Accord) addressed:

1. Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models.

2. Identify, formulate, research literature and solve *complex* engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.

3. Design solutions for *complex* engineering problems and *design* systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

10. Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development.

12. Recognize the need for, and have the ability to engage in independent and life-long learning.

Competencies: At the end of the course the student should be able to

	Competency
C 1	Understand the electric and magnetic properties of materials.
C 2	Understand the mechanical and thermal properties of the materials.
C 3	Choose appropriate magnetic material for transformers, motors, electromagnets, relays and sensors.
C 4	Choose appropriate electrical material for winding of motors and transformers.
C 5	Choose appropriate material for mechanical parts including automotive engine parts and machine tools
C 6	Indentify appropriate composite materials for making printed writing boards and cutting tools.
C 7	Understand the properties of nano structured materials and their applications.
C 8	Understand the classification and applications of construction materials.

Syllabus:

Magnetic materials: Basic concepts – magnetic moment, susceptibility, permeability; Types of materials – Dia, Para, Ferro, Antiferro and Ferri; Hysteresis of ferromagnetic materials; soft and hard magnetic materials; Magnetic materials for transformers, motors, linear motors, pulse transformers, electro-magnets, relays and sensors. **Electrical materials:** Types of materials-conducting materials, insulating materials and dielectric materials; Electrical conduction-Ohm's law, electrical conductivity, resistivity and conductance; Dielectric polarization – Piezo electricity, ferro electricity; materials for winding of motors, transformers. **Mechanical and thermal properties of materials:** Stress, strain, strength, hardness, ductility and malleability, toughness, brittleness; relationship between stress and strain; elasticity and plasticity; deformation- creep, fatigue and fracture. Temperature, specific heat and thermal conductivity. Classification of ferrous and nonferrous materials, types of steels, cast irons, aluminum alloys, copper alloys, super alloys. Automotive engine parts. **Construction materials:** Classification and applications of cement, bricks, stones, wood, glasses and paints. Refractories for furnaces. Composite materials: Laminates, properties of laminates, copper clad laminates, filler, resin, copper foil, phenolic, epoxy, polyester, silicon, polynide laminates. **Nano materials and Nanotechnology:** Basic concepts of nanotechnology. Properties and technological advantage of nano materials. Carbon nano tubes and applications. Nano material preparation by sol gel method and chemical vapor deposition.

Prescribed Text Books

Text Books:

1. Material Science and Engineering by W. D Callister, John Wiely and Sons Company, 2007.
2. Elements of Material Science and Engineering 6th Edition, by V Vlack L.H., Adission-Wesley, 1989.
3. Modern Magnetic Materials, by O'Handley R C, John Wiley & Sons, 2000.

Reference Books:

1. Material Science by V Raghavan (TMH).
2. Material Science by K M Gupta (Umesh Publications).
3. Material Science by O P Khanna (Khanna Publications).
4. Solid State Physics, 6th Edition, S.O.Pillai, Newage International Publishers.
5. Material Science by Armugam, Anuradha Ahencies.
6. Building Materials by B.C Punmia, Lakshmi Publications.