Ver.1-(13-07-2017)

UG Core Courses Syllabus – Monsoon 2017

Sl. No	Course Code	Course Name
1.	SCI421	Advanced Biology(Cellular/Molecular/genetic)
2.	ICS211	Algorithms
3.	ICS331	Algorithms & Operating Systems
4.	SCI644	Biomolecular Structure & Supramolecular Chemistry
5.	CES114	Building Construction Engg
6.	ICS101	Computer Programming
7.	CLG421	Computational Linguistics I
8.	SCI373	CNS Lab
9.	HSS342	Classical Language: Sanskrit II
10.	IEC101	Digital Logic & Processors
11.	IEC102	Electrical Science I
12.	ECE260	Electrical Science II
13.	ECE381	Electromagnetic Theory & Applications
14.	IHS101	English
15.	CEN211	Environmental Science
16.	ECE225	Embedded Hardware Design
17.	SCI101	General Physics (CM+QM)
18.	IHS102	HSS Skills-1 Art and Craft-1 Folk Art & Painting-1 Site and Art-1 Creative Movement-1 Art and Medium-1

19.	IHS103	Human Values I
20.	ICS241	Introduction to Databases
21.	CLG211	Introduction to Linguistics
22.	ICS102	IT Workshop I
23.	ECE205	Linear Electronic Circuits
24.	CLG411	Linguistics 1: Language Typology & Universals
25.	IMA101	Mathematics I
26.	IMA201	Mathematics III
27.	CSE472	Natural Language Processing
28.	ICS231	Operating Systems
29.	ECE230	Probability & Random Processes
30.	SCI439	Quantum Mechanics symmetry &Spectroscopy
31.	ISC201	Science I
32.	SCI371	Science Lab I
33.	ICS261	SSAD & Project
34.	CSE471	Statistical Methods in AI
35.	CSI211	Surveying
36.	SCI331	Thermodynamics & Statistical Mechanics
37.	CET431	Transportation Engineering

SCI421 **Advanced Biology** **3-1-0-4**

Faculty : Vinod PK
Pre-Requisite: Introductory biology or equivalent

Objective: An intensive in-depth treatment of selected topics in Evolutionary biology with emphasis on open questions that may benefit from a multidisciplinary approach including bioinformatics and computational methodology. A critical examination of topics in evolutionary biology such as levels of selection, speciation, patterns of diversification and distribution of

diversity around the globe, origin and radiation of selected groups, biogeography, and phylogeny. Lecturers will highlight Cutting-edge evolutionary research questions.

Course Topics:

The subject is evolution, which is considered at different scales, from genes to populations. The focus is on the concepts and tools such as mathematical and computational, which form an essential basis of evolutionary studies.

Origin of life, Evolution of Life, Prokaryotes - Membranes, Signal Transduction, Homochirality, RNA world, Protein Universe, DNA World, Chromosome, Metabolic pathways, Photosynthesis. Eukaryotes – Multicellularity, Sex, Soma & Germ line Mitosis, meiosis, Organelles, Apoptosis. Disease - Drug Design Targets.

Outcome: Students will

- ✓ understand the underlying causal principles of evolutionary diversification.
- ✓ be able to apply these principles to understand historical and contemporary evolutionary scenarios.
- ✓ be able to use basic conceptual and analytical tools to describe complex relationships within the tree of life.
- ✓ be familiar with a number of experimental and synthetic approaches to analyzing and discovering evolutionary processes (microevolution) and establishing evolutionary patterns (macroevolution).
- ✓ write and discuss knowledgeably about the dimensions of evolutionary issues that require decisions in our society.

Even now the topic of evolution remains as central and fundamental to the biological sciences as it was earlier. A good understanding of it is crucial to the bioinformaticians.

ICS211 **Algorithms** **3-1-0-4**

Faculty: Kannan Srinathan + Pawan Kumar
Pre-Requisite: Discrete Mathematics and Data Structures.

Objective: To teach the basics of algorithm design and analysis.

Course Topics: (A) Thinking towards a solution (algorithm design): This objective is usually achieved by studying several exemplary techniques like: (a) Divide and Conquer. (b) Greedy Paradigm. (c) Dynamic Programming. (d) Linear Programming. (e) Backtracking. (f) Branch-and-Bound etc. **(B)** Analyzing the efficacy (correctness) and efficiency (feasibility) of purported solutions: This objective is usually achieved through several relevant examples like: (a) Solving

recurrence relations. (b) Proving the correctness of a few number-theoretic algorithms. (c) Matroid theory (for greedy algorithms). (d) Proofs of correctness (usually via induction) for several optimization algorithms. (e) Basic results in probability theory (for randomized algorithms). **(C)** Insightfully appreciating the inherent complexity of a given problem: This objective is usually achieved by proving lower bound results and studying basic complexity classes like: (a) The Class P. (b) The Class NP. (c) The Class NPC. (d) The Class BPP. (e) The Class BQP. **(D)** Understanding the limits of computing: This objective is usually achieved by studying: (a) Godel's incompleteness theorem. (b) Church-Turing hypothesis. (c) Proving Undecidability via diagonalization/reduction. (d) Quantum Computing.
Preferred Text Books: (1). Cormen, Leiserson, Rivest, Stein. Introduction to Algorithms (3rd Ed), Prentice Hall of India. **(2).**Sipser Michael. Introduction to Theory of Computation, 2/e, Cengage Learnng.

Outcome: The students would learn how (a) to think about solving computation problems, (b) to prove the correctness and goodness of their solutions, (c) to continually attempt at improving on their approach and (d) to recognize if and when an optimal solution is designed.

ICS331 **Algorithms& Operating Systems** **3-1-0-4**

Faculty: Lini Thomas
Pre-Requisite: Data Structures and Programming

Objective: The plan is to introduce students to the twin topics of algorithms and operating systems. It is planned to be achieved by studying operating systems and switch to its algorithmic aspects to cover algorithmic details. For instance, paging strategies have lot of algorithmic aspects, especially considering also randomized online algorithms. The course will cover algorithms and operating systems in tandem, with one lecture each week devoted to each of the themes.

Course Topics: Topics in Operating Systems: Basic concepts in Operating Systems, Process management, Memory management, File management, Resource management, Concurrency control, Inter-process communication. Tentative List of Topics in Algorithms: Basic concepts in Algorithms, Design methodologies, Greedy algorithms, Online algorithms with application to paging and power management, Advanced data structures for file management, Graph algorithms with application to resource management.

Preferred Text Books: 1) Introduction to Algorithms, Thomas H Corner and etc., Printice Hall, 2nd Edition. **2)** Operating System Concepts, 8th Edition, Silberschatz, Abraham and Galvin, Peter, Addison.

Outcome: Students should be able to apply formal concepts of algorithm design to problem solving. They should be able to argue about efficiency of algorithms, important design

methodologies, and choose appropriate data structures as required to solve problems coming from VLSI, circuit design, system design, and so on. Given that the application areas may include systems with sizable complexity, multi-user support, and interface with other systems, certain principles of system design arising from the field of operating systems are applicable. At the end of the course, students should be able to apply OS concepts such as processes, synchronization, memory and file systems to system design.

SCI345 Biomolecular Structure & Supramolecular Chemistry 3-1-0-4

Faculty: Deva Priyakumar + Tapan Kumar Sau
Pre-Requisite: General and Structural Chemistry or Advanced Biomolecular Architecture.

Objective: To understand biomolecular structures (proteins and nucleic acids), nonbonded interactions, molecular recognition and binding in the context of supramolecular chemistry and biomolecules.

Course Topics: Nonbonded interactions, Proteins - Amino acids: structures and conformations Motifs of protein structures Alpha-domain structures, Alpha/beta structures, Beta structures, Protein folding and stability, Membrane proteins. Nucleic acids - Building blocks of nucleic acids, DNA structure–different forms of DNA, RNA structure (including noncanonical structures). Determination of biomolecular structures (Xray and NMR). Molecular recognition and binding - Lock and key, and induced fit mechanisms, Measurement of binding constants, Thermodynamic and kinetic aspects,
Cooperativity. Biological and synthetic ion binding hosts (crown ethers, calixarenes, ion channels, etc.), Inclusion complexes (cyclodextrins, zeolites, cyclophanes, etc.), Protein-ligand, RNA-ligand and Protein-DNA binding Enzyme catalysis, and supramolecular catalysis

Preferred Text Books: 1. Introduction to Protein Structure by Branden & Tooze. **2.** Supramolecular chemistry by Steed & Atwood. **3.** Other material that will be given.

ICS101 Computer Programming 3-1-3-5

Faculty: Anoop Namboodiri + Praveen Paruchuri

Objective: 1. To introduce problem solving methods and algorithm development. **2.** To teach programming language 'C'. **3.** To teach how to design, code, debug and document programs using techniques of good programming style.

Course Topics: Programming Language 'C' and programming: Basic Syntax and Semantics, Variables, Types, Expressions, Assignment statements, Conditional and Iterative Control Structures, Simple I/O, Functions and parameter passing, Strings and string processing, Pointers and References, Structures, Recursion. Algorithm development: Techniques of problem solving, Stepwise Refinement, Simple numerical examples, algorithms for searching and sorting, merging order lists. Examples taken from such areas as business applications involving data manipulation, and simulation involving games.

Outcome: 1. Analyze and explain the behavior of simple programs involving the fundamental programming constructs. **2.** Modify and expand short programs that use standard conditional and iterative controls structures and functions. **3.** Design, implement, test and debug a program that uses each of fundamental programming constructs. **4.** Apply the technique of structured decomposition to break a program into smaller pieces.

CLG421 Computational Linguistics I 3-1-0-4

Faculty: Soma Paul + Dipti M Sharma
Objective: Basic knowledge of theoretical linguistics and its application in NLP.

Course Topics: Challenges in processing natural languages: Analyzing the structures, Dealing with ambiguities, Structural units in language: word, phrase, sentence, Morphology - Words and how they are formed, Basic building blocks in morphology - morphemes; Word formation (function based), inflectional, derivational, Word formation processes Affixation, suffixation, prefixation, infixation, Non-concatenative, Compounding, Morphotactics -- constraints on affixes; Morphophonology, Developing morphological analyzers and generators approaches, (a) Paradigm based - paradigm tables, add - delete rules, (b) Finite state machineries. 3. Syntax : Words in a sentence : word classes, Part of Speech, POS tagging, defining tagset for your language, Rule based part of speech taggers, Statistical part of speech taggers, Issues in tagging, Syntactic structures - Constituency, phrases and constituent structures, Subcategorization Agreement, Auxiliary verbs; Representing phrase structures, Deriving phrases using phrase structure rules (CFG), Dependency structure, Constraints on rules, Feature structure, Syntactic dependencies, Modifier - modified trees - Paninian approach, Karaka relations - karaka semantic model, karma and other karakas, tadarthya, Karaka vibhakti mapping, Lexical vibhakti giving the flexibilty of free word order, Choice of Vibhakti governed by TAM. Annotating syntactic relations - developing tagset, Lexical Semantics Subcategorization; Ambiguity, Sense relations - homonymy, polysemy, hypernymy, hyponymy, synonymy etc.

Preferred Text Books: 1. Jurafsky & Martin, 2000; Speech and Language Processing, Pearson Education. **2.** Bharati et al., 1995; Natural Language Processing. A Paninian Perspective. **3.** Fromkin, V, Robert Rodman, Nina Hyams (2002) An Introduction to Language, Thomson Wadsworth.

Outcome: At the end of the course the students will be able to understand and analyse actual language data and develop computational resources for various levels of language structures.

SCI373 CNS Lab 0-1-4-4

Faculty: Prabhakar Bhimalapuram + Deva Priyakumar
Objective: Hands on training to application of computational tools such as quantum mechanical calculations, molecular dynamics simulations, Monte Carlo simulations, minimization of molecules
Course Topics: **1.** Writing Z-matrices for simple molecules. **2.** Conversion of internal coordinates to Cartesian coordinates. **3.** Implementing Huckel Molecular Orbital theory using any programming language. **4.** Geometry Optimization of simple molecules using GAMESS. **5.** Frequency calculations and normal mode analysis. **6.** Conformational analysis of simple linear molecules. **7.** Numerical methods for classical simulations. **8.** Molecular dynamics simulation. **9.** Monte Carlo simulation.

Preferred Text Books: Molecular Modelling by Andrew Leach; Molecular Modeling and Simulation by Tamar Schlick.

Outcome: Familiarity to state of the art program packages for doing basic quantum mechanical calculations, and molecular dynamics simulations; Understanding and implementation of simple methods such as Huckel methods, etc.

IEC101 Digital Logic and Processors 3-1-3-5

Faculty: Anil Kumar Vuppala + Madhav Krishna
Course Topics: Overview of the Digital Computer – The user's view of software and hardware; Application and system software; Central processing unit (CPU), memory and input/output devices. Binary Arithmetic – Representation of integers, fractions and signed numbers in different codes; Addition and subtraction operations on binary-coded numbers; Algorithms for performing multiplication and division. Combinational Circuits – Boolean expressions and their minimisation using algebraic identities; Karnaugh map representation and minimisation of Boolean functions using K-map; Two-level realisations using gates – AND-OR, OR-AND, NAND-NAND and NOR-NOR structures; Combinational Circuits using MSI Modules – Multifunction gates, Multi-bit adder, Multiplexers, Demultiplexers, Decoders, Programmable ALU; Multiplexer-based realisation of K-maps; Combinational circuit design using multiplexers and gates. Sequential Circuits – Latches and Flip-flops; Ripple counters using T flip-flops; Synchronous counters; Shift Registers; Ring and MLS counters; Sequence generator using J-K / D flip-flops. Introduction to HDL – Processor Architecture – Processor as a programmable digital

system; Basic constituents of a processor – Programmable ALU, Register array and Programme sequencer; Concept of machine language and assembly language; Microprogrammes for machine language instructions. Input/Output Interfaces – Programmed I/O; Interrupt-driven I/O; Programmable Peripheral Interface (PPI) for parallel port; Programmable serial port (UART).

IEC102 Electrical Science I 3-1-0-2 (Half-semester)

Faculy: Rambabu Kalla

Course Topics: Basic Circuit Elements – Resistor, Capacitor, Inductor; Voltage and Current Sources; Controlled Sources of different types. Fundamental Concepts – Additivity, Homogeneity and Linearity; Principle of Superposition; Energy and Power; Active and Passive Circuit elements. Time-domain Analysis – Kirchhoff's laws; Node and Mesh methods of analysis; Time-domain analysis of a-c circuits using Differential Equations; Transient and Steady-state response. Sinusoidal Steady State Analysis – Notions of Phasors, Impedance, Transfer Function and Frequency response; Circuit equations in terms of phasors and their solutions using complex algebra; Frequency response and Bode plot; Analysis of simple RC and RLC circuits. Network Theorems – Simplification of networks, Thevenin's and Norton's theorems, Maximum power transfer theorem. Two-port Parameters – Characterisation of a four-terminal network based on its terminal voltages and currents; Definitions of two-port parameters; Interrelationships among z-, y-, h- and g- parameters; Two-port parameters of Series and Parallel Combinations of Networks.

ECE260 Electrical Science II (Half Semester course) 3-1-0-2

Faculty : Rambabu Kalla

Course Topics : (1) D. C. Machines: Principle of operation of dc machines, armature windings, E.M.F. equation in a dc machine, Operation of a dc machine as a generator, Types of generators, operation of a dc machine as a motor, Types of DC Motors, Torque production in a dc motor. **(2)** Magnetically Coupled Circuits and Transformers : Magnetically Coupled Circuit, Principle of operation of single phase transformer – types, Phasor diagram on No Load and Load – Equivalent circuit, Losses and Efficiency of transformer and Regulation. **(3)** A.C Machines: Three phase induction motor, principle of operation, slip and rotor frequency, torque, types of induction motors. Synchronous Machines: Principle of operation, EMF equation, regulation by synchronous impedance method, Synchronous motor principle and operation and starting methods. **(4)** Measuring Instruments: Introduction, classification of instruments, operating principles, Moving coil permanent magnet (PMMC) instruments, Moving Iron instruments, Transducers.

Text Books: 1. A Text Book of Electrical Technology Volume II, by B.L. Theraja and A.K. Theraja, Pub: S. Chand & Company Ltd. **2.** Engineering Circuit Analysis by William H. Hayt, Jr., Jack E. Kemmerly, Steven M. Durbin, Pub: Tata McGraw-Hill **3.** A Course in Electrical and Electronic Measurements and Instrumentation by A. K. Sawhney, Pub: Dhanpat Rai & Co.

ECE381 Electromagnetic Theory & Applications 3-1-0-4

Faculty: Syed Azeemuddin

Objective: To enhance the mathematical and physical perspective of electromagnetics.

Course Topics: Vector Algebra: Introduction, Scalars and Vectors, Products of Vectors, Definition of Fields, Systems of Coordinates, Position Vectors. Vector Calculus: Integration of Scalar and Vector Functions, Differentiation of Scalar and Vector Functions, Conservative and Nonconservative Fields, Null Vector Identities and Classification of Vector Fields. Coulomb's Law and the Electric Field: Charge and Charge Density, Coulomb's Law, The Electric Field Intensity, The Electric Flux Density. Gauss's Law and the Electric Potential: The Electrostatic Field: Postulates, Gauss's Law, The Electric Potential, Materials in the Electric Field, Interface Conditions, Capacitance, Energy in the Electrostatic Field: Point and Distributed Charges. Boundary Value Problems: Analytic Methods of Solution: Poisson's Equation for the Electrostatic Field, Laplace's Equation for the Electrostatic Field, Solution Methods. Boundary Value Problems: Numerical (Approximate) Methods: The General Idea of Numeric Solutions, The Finite Difference Methods: Solution to the Laplace and Poisson Equations, The Finite-Element Method: Introduction. The Steady Electric Current: Conservation of Charge, Conductors, Dielectrics, and Lossy Dielectrics, Ohm's Law, Power Dissipations and Joule's Law, The Continuity Equation and Kirchoff's Current Law, Current Density as a Field, Interface Conditions for Current Density, The Static Magnetic Field: The Magnetic Field, Magnetic Field Intensity, and Magnetic Flux Density, The Biot-Savart Law, Ampere's Law, Magnetic Flux Density and Magnetic Flux, Postulates of the Static Magnetic Field, Potential Functions. Magnetic Materials and Properties: Magnetic Properties of Materials, Magnetic Interface Conditions, Inductance and Inductors, Energy Stored in the Magnetic Field, Magnetic Circuits, Forces in the Magnetic Field, Torque. Faraday's Law and Induction: Faraday's Law, Lenz's Law, Motional Electromotive Force: The DC Generator, Induced EMF due to Transformer Action, Combined Motional and Transformer Action Electromotive Force, The Transformer, Eddy Currents. Maxwell's Equations: Maxwell's Equations, Time-Dependent Potential Functions, Interface Conditions for the Electromagnetic Field. Electromagnetic Waves and Propagation: The Wave, The Electromagnetic Wave Equation and Its Solution, The Electromagnetic Spectrum, The Poynting Theorem and Electromagnetic Power Density, The Complex Poynting Vector, Propagation of Waves in Materials, Polarization of Plane Waves. Reflection and Transmission of Plane Waves: Reflection and Transmission at a General Dielectric Interface: Normal Incidence, Reflection and Transmission at a General Dielectric Interface: Oblique Incidence on a Conductor, Oblique Incidence on Dielectric Interfaces, Reflection and Transmission for Layered

Materials at Normal Incidence. Theory of Transmission Lines: The Transmission Line, Transmission Line Parameters, The Transmission Line Equations, Types of Transmission Lines, The Field Approach to Transmission Lines, Finite Transmission Lines, Power Relations on a General Transmission Line, Resonant Transmission Line Circuits, The Smith Chart, Impedance Matching, and Transmission Line Circuits: The Smith Chart, The Smith Chart as an Admittance Chart, Impedance Matching and the Smith Chart, Quarter-Wavelength Transformer Matching. Transients on Transmission Lines: Propagation of Narrow Pulses on Finite, Lossless Transmission Lines, Propagation of Narrow Pulses on Finite, Distortion less Transmission Lines, Transients on Transmission Lines: Long Pulses, Transients on Transmission Lines: Finite-Length Pulses, Reflections from Discontinuities, Transients on Lines with Reactive Loading, Initial Conditions on Line, Waveguides: The concept of a Waveguide, Transverse Electromagnetic, Transverse Electric, and Transverse Magnetic Waves, TE Propagation in Parallel Plate Waveguides, TM Propagation in Parallel Plate Waveguides, TEM Waves in Parallel Plate Waveguides, Rectangular Waveguides, Optical Waveguides, Cavity Resonators, Energy Relations in Cavity Resonators, Quality Factor of Cavity Resonators. Antennas and Electromagnetic Radiation: Electromagnetic Radiation and Radiation Safety, Antennas, The Electric Dipole, Properties of Antennas, The Magnetic Dipole, Practical Antennas, Antenna Arrays, Reciprocity and Receiving Antennas, Effective Aperture, The Radar, Microstrips, The Finite Difference Time Domain Method: Fundamentals, Stability, Convergence, Boundary Conditions, Simulations, Electromagnetic Field Simulation: Fundamentals, Criteria, CST Microwave Studio, Remcom XFDTD, Ansoft HFSS.

IHS101 **English 1** **2-0-0-2**

Faculty: Aruna Chaluvadi

This course is offered to the students whose performance is poor in a diagnostic test.

Objective: Improve Writing, Reading, Listening and Speaking skills.

TITLE **: Environmental Sciences**

CREDITS : **4**

TYPE-WHEN **:** BSD core & Open elective (Monsoon)

FACULTY NAME **:** Dr. Rama Chandra Pillutla

OBJECTIVE

The course mainly deals in understanding the causes, effects and possible solutions to mitigate the continuing problems of environmental degradation. It aims to fulfill the knowledge gap and

also motivate students to integrate IT towards the environmental issues at global, national and local levels.

Course Content

1 Basic of Environmental Science & Technology

Basic concepts of environmental science & technology, major issues and challenges. Concepts of sustainable development, Ethics of stewardship, Scope of environmentally sound technologies.

2. Ecological Engineering

Ecological engineering as a tool for restoration of degraded ecosystems, Concepts and strategies of restoration.

3. Environmental Impact Analysis and IT

Assessing the environmental impact of an activity; use of non-renewable resources and other damage to the environment; take into account all phases from design and construction, through operational life, to final decommissioning and disposal. . Power consumption of various storage technologies. The environmental impact of data centres; tools for estimating and reducing the carbon footprint of data centres. Environmental issues surrounding the disposal and recycling of IT equipment.

4. The Environmental Effects of Communication systems

Balancing the environmental costs of communication systems against their environmental benefits.

5. IT and Environmental Sustainability

How, in the immediate- to near-term, can IT minimize its impact on the global environment?

How can IT support cultural and process changes that help people and organizations respond tactically, strategically, and systemically to create a more energy efficient world.

6. Environmental Economics

World environmental history and economic development, Valuation of natural resources, Sustainable agriculture and development, Cost benefit analysis and integrated economic modeling, Environmental indicators and their use in resource management

7. Climate Change & Abatement Technologies

Technologies to minimize and combat climate change

8. Environmental Legislation & Impact Assessment

Important legislations related with environment; Environmental Auditing; Environmental Ethics

9. Socio-economic Dimensions of Environmental Management

Reference Books

1. Environmental Science – The natural environment and human impact (1998): A. R. W. Jackson and J. M. Jackson, Longman

2. Environmental Science (2001): S. C. Santra, New Central Book Agency (P) Ltd

3. Environmental Science (6^{th} ed) (1997): Jr. G. T. Miller, Wadsworth Pub. Co.

4. Dimensions of Environmental and Ecological Economics (2005): N. C. Sahu & A. K. Choudhury (Ed), Universities Press

GRADING: Assignments: 20%; Project work: 20%; Midterm exams: 30%; Final exam:30%

Outcome:

Understanding various environmental issues of concern

Identify and evaluate environmental technologies

Interpret local environmental technologies.

Implications of IT to combat emerging environmental problems

ECE225 Embedded Hardware Design 3-0-3-4

Faculty: Madhav Krishna

Objective: The objective of this course is to introduce the students to basic concepts, components and elements in embedded design that includes both controller and FPGA parts. The course is primarily hands on and activity based, where several activities/experiments centered around the Atmel series of controllers such as the ATMega16 and Spartan based FPGA boards such as the Nexys-3 board are accomplished by the students.

Course Topics: Introduction to Controllers and Processor Peripherals, Ports and I/O Programming, Timer Programming, ADC and ADC based applications, USART Programming, PWM output generation, Interrupts, I2C framework, protocol and programming, SPI and other Serial Communication protocols.

VLSI Design Styles and comparison between the different design styles. Introduction to FPGA and overview of different FPGA technologies. Architecture of an SRAM based FPGA. Study of

different internal blocks of an SRAM based FPGA. Realization of logic functions within the logic blocks of an FPGA. Type example of a simple Xilinx / Altera family SRAM based FPGA. Architecture of a Non-volatile (Anti-fuse) based FPGA. Study of operation of Anti-fuse. Realization of logic functions in an non volatile FPGA. Type example of an Actel family non volatile FPGA. Architecture of an EPROM based FPGA. Study of EPROM. Physics of operation of MOS cells in an EPROM circuit. Top down design methodology for realization of logic functions on an FPGA. Transformation of hardware description language constructs into architectural design on an FPGA. Design optimizations in an FPGA for speed, power and area optimization. Introduction to Physical Design on an FPGA. Notion of partitioning, floor-planning, placement and routing and the algorithms for physical design steps in the light of programming an FPGA. Clock routing in an FPGA. Design optimizations for peripheral integration for embedded systems based on FPGA. Introduction to PLA, PAL, CPLD. Notion of realization of logic functions on a CPLD.

Preferred Text Books: 1. Atmel AVR microcontroller primer: programming and interfacing By Steven F. Barrett, Daniel J. Pack. **2.** Microcontrollers Fundamentals for Engineers And Scientists By Steven F. Barrett, Daniel J. Pack

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IHS102 HSS Skills 1 2-0-0-2

There are 5 skills courses are available. They are

Art and Craft-1
Folk Art & Painting-1
Site and Art-1
Creative Movement-1
Art and Medium-1

1. Art and Craft-1

Objective: This course starts with an idea of art spectrum and its fundamentals. What is art & craft and how are they linked to each other. What distinguishes the origin of them and gradually it moves into the study of imagination. Keeping the idea of imagination as a center of gravity, it deals with the movements in action, introspection, impression, expression in relation with the productive articulation. So the course has two fundamental features in its whole. One is practice in terms of actual productive experience and the other one is the background of it. When the background leads into a culture of productivity, it theorizes the notion of a productive culture in creation. Thus the idea goes back to an internalized concept of creation.

Course Topics: Understanding of Art and Craft in details, Visual practices, Imagination, articulation and theory, Composition 1. Imagination of the space of existence, Imagination of the space of non – existence, Study of depth and space in composition, Collage, Still life study,

Outdoor study etc., Understanding the space in imagination and experience, Study of the strokes in imagination and order. The idea of design, Idea of design in art and everyday life, Designs of expression and function Expressional design in practice: Tapestry (Weaving), Patch work/ Surface design, Functional design in practice: A. Furnishing design, B. Apparel/Costume design (Silk screen printing, Batik, tie and dye). This part continues in the second semester for 3/4 weeks.

2. Folk Art & Painting-1

Objective: Learning and understanding Indian folk art in a broader sense with hands-on activities.

Course Topics: The students will be introduced to the different folk art Schools such as Warli, Madhubani, Gondand Kalighat paintings with practical presentations to help to understand more.

3. Site and Art-1

Objective: Site and Art course dealt with understanding of 2 and 3 dimensional spaces. It involved exploration of surfaces through the use of different media such as lead, pigment and found objects.

Course Topics: The first course involved exploration of 2 dimensional spaces, understanding of elements of visual arts through drawing from nature and man-made objects. Exploring various textural surfaces by methods of woodcut and frottages.

4. Creative Movement-1

Objective: Of the course is to understand and explore body, movement and various theories related to it. One constructs or brings forth the movement which comes from the understanding of their own body and movement. These are based on the bodily cues based on breath, touch and urge to move. It is a joyous way to explore body and bodily understandings like body image, space, time etc

Course Topics: Theory - Laban Movement Analysis, Lived body experience, Phenomenological approach to movement by Maxine Sheets-Johnstone, Arche Movements.

5. Art and Medium-1

Objective: A thoughtful observation on Visual art practice emphasizing on execution

Course Topics: Discussion on ‘how we understand or define art’(sense of beauty, distinction between art beauty, intuition, classical ideal, uniformity, form and expression, the golden section, geometrical harmony, distortion, pattern, personal element, sentimentality) through

slide presentation of world art. The fundamentals of a work of art: Line, Notan (tone), Color and application of them by paper in different compositional dimension (square, circle, rectangle). Experiencing paper in three dimensional formats

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IHS103 Human Values-1 0-2-0-2

Objective: The course is aimed at providing a basic understanding of human values; essential complimentarily of skills and values; developing correct perception of human life and human happiness; basic framework of universal human values; applying them to the self.

Course Topics: The classes in the course will run as a series of discussions in small groups. Some topics which can be taken up for discussion are given below.

1. Relationships - with your friends, with teachers, with family members, with others. 2. Respect - do you respect yourself? Do you respect others? 3. Inner self as a source of our strength. Key to happiness. 4. Expectations from yourself: Excellence and competition. Coping with stress. 5. Distinction between info. & knowledge 6. Distinction between Means and ends. 7. Distinction between objective and living 8. Complimentarily of skills and values. Ethics in profession. 9. Relationship with nature: Becoming conscious of right utilization of physical resources, i.e., water, electricity, food, labs., internet, personal items.

There would be no formal lectures in the course. For the above topics, scenarios would be created, and used to initiate discussion pertaining to the above topics. Besides discussions, the students will apply the understanding so gained in the above to themselves.

Outcome - At the end of the course, students are expected to become sensitive to human values and their central role in achieving human happiness. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings.

ICS241 Introduction to Databases 2-1-0-2

Faculty: Kamal Karlapalem

Objective: It covers the development of database-driven applications using the capabilities provided by modern database management system software. The concepts include conceptual modeling, relational database design and database query languages.

Course Topics: Introduction; Database System Concepts and Architecture; Data Modeling Using the Entity-Relationship Model; The Enhanced Entity-Relationship (EER) model; The Relational Data Model and Relational Database Constraints; ER/EER to Relational Model mapping; Relational Algebra and Relational Calculus; SQL-99: Schema definition, Constraints, Queries, and Views; Security; Introduction to SQL programming Techniques; Functional dependencies and normalization for relational databases; Relational database design algorithms and further dependencies. As a part of the lab, project work is included.

Preferred Text Books: Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education, 5th Education.

Outcome: After completing the course, the students will understand (i) how to design a database, database-based applications (ii) How to use a DBMS (iii) the critical role of database system in designing several information system-based software systems or applications.

CLG211 Intro to Linguistics 3-1-0-4

Faculty: Radhika M + Dipti M Sharma

Objective: To provide a bird's eyeview of the area of linguistics to the students. So that they have an understanding of what is the domain of linguistics and why would it be relevant for computational linguistics.

Course Topics: 1. What is language? Difference between human language and Animal languages.
Natural language and Artificial language, Characterstic features of human language, what we know about language. 2. Study of Human language – the field of Linguistics. 2.1 Looking at language from synchronic and diachronic points of view. 2.2 Areas of study, a) From structural perspective: Syntagmatic and paradigmatic aspects of language structure, Levels of structural analysis: Phonetics and Phonology, Morphology, lexicon, syntax, semantics, pragmatics. b) From evolution perspective : Historical Linguistics. c) From usage perspective : Sociolinguistics. d) From Psychological perspective : Mechanisms of language acquisition, knowing more than one language. e) From Computational perspective : Processing natural languages. 3. Language as a means of communication. 3.1 What is communication ? (from http://www.uni-kassel.de/fb8/misc/lfb/html/text/startlfbframeset.html). 1. Saussure's model of the speech circuit. 2. Shannon's and Moles' communication models. 3. Elements of the communication process. 4. Bühler's organon model. 5.Jakobson's model of communicative functions. 3.2 Indian Grammatical Tradition : A communication model for language study.

Preferred Text Books: Language: Nature, Psychology and Grammatical Aspects by Victoria Fromkin, Robert Rodman and Nina Hyams, Cenage Learning (Indian Edition)

ICS102 IT Workshop I 2-0-3-3

Objective: This course is intended to make new UG I students comfortable with Linux and computers in general. It also covers HTML

Course Topics: Lectures and Labs: 1.Basic Internet Skills, 2.Filesystem and shell, 3. vi editor, 4. OpenOffice.org Writer, 5. OpenOffice.org Spreadsheet (Calc), 6. OpenOffice.org Impress, 7. Basic HTML, 8. HTML Forms.

Outcome: At the end of course students are comfortable with Linux shell and can ssh / scp to servers to work on them remotely or to copy files to / from them. Students also become comfortable with Basic HTML display elements and also HTML forms. They get slight introduction to GET and POST methods.

ECE205 Linear Electronic Circuits 3-1-3-5

Faculty: Zia Abbas
Course Topics: Semiconductors, Junctions & Contacts – Carrier transport phenomena (recombination, drift, diffusion); Semiconductors in Magnetic fields – Hall effect; Magneto-resistance; v-i characteristics of Junction and Schottky barrier Diodes. Transistors – Bipolar junction transistors: current-voltage relations – Ebers Moll and Gummelpoon models; JFET, MOSFET, TFT, MESFET – various regions of operation including sub-threshold and breakdown regions. Circuits from Devices – Large-signal and small-signal behaviours of circuits containing nonlinear devices; Incremental equivalent circuits for small-signal operation; Biasing requirements for BJT and FET; Resistive biasing circuits; Biasing using current source. Small-signal Amplifiers – Amplifier configurations based on single transistor (BJT / FET); Analysis of single-stage amplifiers – gain and impedance parameters; Separating the signal from the bias; Difference amplifier; Cascode amplifier; Amplifiers for specific frequency response: audio, video and tuned amplifiers, wideband amplifiers. Multistage Amplifiers – Specifications for Input, Intermediate and Output stages: Impedance matching, Gain, Frequency response, Stability; The circuit of a typical Operational Amplifier as a case study.

IMA101 Maths -I 3-1-0-4

PRE-REQUISITE: 10 +2 Mathematics
Faculty: Indranil Chakrabarty
OBJECTIVE:

COURSE TOPICS: Logic, Propositional Equivalences, Predicates and
Quantifiers Sets, Set Theory, Relation, Partial order relation, Hasse digram,

Definition and examples of simple graphs, degree of vertex, Isomorphism, Connectedness, Adjacency, Subgraph, Matrix Representation. Eulerian and Hamiltonian graphs, Trees, planarity, Colouring Vertices, Colouring Maps, Colouring Edges, Chromatic Polynomial. Bipartite Graph, Hall's Marriage Theorem, Network flows.

Multinomial coefficients, Second order Homogeneous Recurrence relations with constant coefficients, Second order linear non-homogeneous recurrence relations with constant coefficients. Generating functions, Combinations with repetitions, Linear algebraic equations with unit coefficients. Principles of inclusion, exclusion**.**

PREFERRED TEXT BOOKS: Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, Pearson Education. Norman L. Biggs, Discrete Mathematics, Press

***REFERENCE BOOKS: Discrete Mathematics by Richard Johnsonbaugh, Pearson Education**

***PROJECT: There is no project**

GRADING: End Exam - 30%

Mid term 1-10%
Mid term 2-10%
Tutorial Problem Solving- 20%
Assignment- 15%
Tutorial Quiz - 15%

OUTCOME:
REMARKS:

IMA201 Mathematics III 3-1-0-4

Faculty: Lakshmi B
Course Topics: 1. Analytic function of complex variable, Cauchy-Riemann Equation. Integration of a function of a complex variable, M-L inequalities. Cauchy's Integral Theorem. Cauchy's Integral formula. Taylor's and Laurent Expansion, Poles and Essential Singularities, Residues, Cauchy's residue theorem, Simple contour integrals. **2.** Elements of probability theory, Bayes theorem, Random variable PDF and CDF, Mean and Variance. Markov and Chebshev inequality, Binomial, Geometric and negative Binomial Distributions Poisson and hypergeometric distributions. Uniform, exponential and Normal distributions, Linear combination of independent normal random variable. Central Limit theorem. Distribution of Several Random

Variable, Covariance, Correlation. **3.** Classification of Random Process, Average value of random process, Random Walk, Wiener process.

Preferred Text Books: 1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley. **2.** Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley. **3.** I. N. Herstein, "Topics in Algebra", Wiley

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CSE472 Natural Language Processing 3-0-1-4

TYPE-WHEN : Monsoon-2017

FACULTY NAME : **Manish Srivastava**

PRE-REQUISITE : Intro to NLP

OBJECTIVE : This is the advanced course in Natural Language Processing intended for honors, dual degree, BTP, MTech and PhD students.

COURSE TOPICS : In this course, students get an overview of various areas in NLP and the current research trends in each of them. The topics covered include machine translation (rule based & statistical), discourse, statistical parsing, word sense disambiguation, natural language generation, coreference resolution, semantic role labeling etc.. The course also covers two of the most popular machine learning methods (Expectation-Maximization and Maximum Entropy Models) for NLP. Students would be introduced to tools such as NLTK, CoreNLP to aid them in their research.

***PROJECT:** There will be a mini project and research readings once every alternate week.

ICS231 Operating Systems(UG) 2-1-1-3

Pre-Requisite: Computer Organization
Faculty: P. Krishna reddy
Objective: To understand modern operating system principles.

Course Topics: 1. Basics of computer organization. System structures, services and device interfaces. Types of requirements of various computing systems. Concepts of multi-programming and shared systems. Introduction to virtualization and protection in operating systems. **2.** Processes management and principles. Multi-threading concepts. Process

scheduling disciplines and tradeoffs. **3.** Memory synchronization principles: mutual exclusion and dead locks. Algorithms and techniques to handle synchronization problems. **4.** Memory management. Concepts of memory segmentation and paging. Virtual memory realization and issues. Caching. **5.** File management systems. Disk scheduling and other issues.

Preferred Text Book: Operating System Principles –Galvin, Gagne and Silberschatz, Wiley.

ECE230 Probability and Random Processes 3-1-0-4

Faculty: Prasad Krishnan

Objective: Complex Communication, Control, Signal Processing and allied engineering systems have to be designed to perform well not only under deterministically described input signal conditions, environmental disturbances and modeled-system parameters but also under conditions that cannot be so described. The probabilistic paradigm, for such uncertain situations, besides providing a methodology for usable descriptions of signals and systems, has facilitated the design of systems whose performance degradations in those adverse conditions are tolerable if not minimal.

Aspiring professionals and educators in the above mentioned disciplines must therefore have a basic understanding of the probabilistic paradigm and comprehensive competence in the calculus of random signals and systems. The course "Probability, Random Variables and Stochastic Processes" is aimed at enabling the acquisition of that understanding and competence.

Course Topics: Introduction to Uncertainty, Set theoretic Notation, Sample spaces and Simple outcomes, Sigma Field and Compound Events, Probability Measure function, Mutually Exclusive Events, Conditional Probability Measure,Independent Events, Bayes' Theorem. Product Spaces and Independent Trials, Bernoulli Trials, Laplace-Demoivre's Theorems, Sum spaces. Random Variables and its Distributions- Cumulative Probability Distribution, Probability Density Function Characteristic Function, Moments and Moment Generating Functions, Cumulants, Conditional Distribution Function. Function of a Random Variable and its Distribution Functions, Bounds. Random Variables and their Joint, Marginal and Conditional Distribution Functions; Independent Random Variables N- Functions of M-Random Variables and their Distribution Functions Sequence of Random Variables, Convergence of a Sequence of Random Variables, Convergence Theorems Stochastic Processes and their Characterization, Mean, Auto Correlation Function, Auto Covariance Function, Strictly Stationary, Wide Sense Stationary and Ergodic Processes, Gaussian Random Processes. Vector Stochastic Processes, Mean, Cross-Correlation and Cross-Covariance, Jointly Gaussian Processes.

Stationary Stochastic Processes, Power Spectral Density, Wiener-Khinchine Theorem, White Noise.

Complex Random Process, Representation of Low Pass and Narrow Band Wide Sense Stationary Stochastic Processes. Karhunen-Loeve Expansion for a Random Process. State Variable Description for a Random Process.

Preferred Text Book: A. Papoulis: Probability, Random Variables and Stochastic Processes.

SCI437 Quantum Mechanics II & Spectroscopy 3-1-0-4

Faculty: Harjinder Singh

Objective: Origins, domain of dominance and relevance of quantum phenomena with particular stress on quantum mechanics will be studied.

Course Topics: 1. Introduction. **2.** Quantum versus classical Physics; Wave particle duality, probability amplitude. Measurement and Uncertainty, matrix formulation. **3.**Time independent Simple applications: Harmonic oscillator, Angular momentum, Perturbation theory, Variation theorem, Hellman-Feynman theorem, H atom, H_2 molecule, Born-Oppenheimer approximation. **4.** Further applications: Periodic potential (solids), electronic structure of molecules, Hartree Fock theory, etc.**5.** Time dependent quantum mechanics, Evolution of a wave packet. Fermi-Golden rule, etc. **6.** Miscellaneous Applications. **7.**Special topics: Spinors, Klein-Gordon and Dirac equations.

Preferred Text Books: 1. P.A.M. Dirac, The Principles of Quantum Mechanics. **2.** W. Greiner and B. Muller, Quantum Mechanics. **3.** B. H. Bransden and C. J. Joachain, Quantum Mechanics. **4.** Enrico Fermi, Notes on Quantum Mechanics.

Outcome: A deeper understanding of quantum theory and an ability to apply its methods to solving problems in diverse fields.

ICS261 SSAD & Project 3-0-3-3

Faculty: Raghu Reddy + Ramesh Loganathan

Objective: 1) Inculcate essential technology and software engineering knowledge and skills essential to build a reasonably complex usable and maintainable software iteratively. 2) Emphasize on structured approach to handle software development. 3) Enhance communication skills

Course Topics: 1) Introduction to Software Engineering, Lifecycle, Process Model - Traditional Vs Agile processes. 2) Web Technologies, Frameworks and Configuration Management - Version Control, Ruby on Rails/Web2py/Struts. 3) Project and Team Management - Project organization concepts (roles, tasks, work products), Configuration Management, Release Planning, Organizational activities (communication, status meetings). 4) Development Activities - Requirements (Analysis and Specification), Architecture and Design, System Decomposition,

Software Architectural styles, Documenting Architectures, Design patterns. Quality Assurance - Unit, Integration, System and Acceptance Testing, Introduction to various testing techniques (e.g. Stress testing) , Software Refactoring.

Preferred Text Books: Software Engineering – A Practitioner's Approach, 7th Edition, Roger Pressman.

Outcome: The proposed course is expected to provide an introduction to software engineering concepts and techniques to undergraduate students, thus enabling them to work in a small team to deliver a software system. The course content and project will introduce various software technologies, process and project management skills that are needed for the delivery of software in a team setting.

ISC201 Science I 3-1-0-4

Faculty: Marimuthu Krishnan

Objective: These courses (Science-I and Science-II) will provide integrated knowledge of basic physics and mathematics applied to the molecular world of natural systems. Most topics will be covered in an interrelated manner. The level of sophistication will gradually develop with motivational content in the beginning to sophisticated details at the end. Illustrations and suitable problems will be offered at every stage of the course.

Course Topics: 1) Introduction: (visual presentation) The relevance of basic science for an IT student, a popular level presentation on symbiotic relationship between computer technology and science, the semiconductor, nanotechnology, molecular logic, keyword level ideas of quantum computing and DNA computing (without details). **2)** Scales in Nature; time scales (atomic unit to the astrophysical time scales), length scales (radius of an atomic nucleus, size of a DNA, living beings on earth, to light years), energy scales (1 Hartree to fusion in the sun). Equations similar in appearance but describing processes of different scales, dimensionless numbers. Skills learnt: units and dimensions, dimensionless perception of a problem. **3)** Mathematical modeling in sciences, (i) geometry and linear algebra, Geometric profiles of variable quantities (physical properties described as algebraic, trigonometric and other functions of variables like temperature, etc.), e.g., harmonic oscillator potential, Hooke's law force, etc., (ii) change and calculus, expression of a spatio-temporal change in terms of a differential equation, the diffusion equation, the heat conduction equation, equation of continuity, (simple conversion of natural observations into mathematical forms) (iii) vector formulation of a multi-variable problem, coupling of variables described as matrix elements; example of symmetric and asymmetric stretching in CO_2 described as normal modes. Skills: modeling of simple problems. **4).** Forms in Nature (mostly visual presentation): molecular structures, crystal lattices, biological molecules, fractals and self organized structures, basic ideas of symmetry and group theory. Examples of linear and nonlinear structures (visual presentation), variety of nonlinear forms like trigonal, pyramidal, tetrahedral, octahedral, fullerene structures etc., cubic (simple, fcc and bcc) crystal structures, packing, etc., examples

of simple fractals like Koch curve, Koch island, Peano curve, etc., fractals in Nature. Skills: imagining diverse forms. **5)** Relevance of thermodynamics, - the thermodynamic space, state and path functions, work, heat, mechanical and thermal equilibrium, The macroscopic laws of thermodynamics, 0^{th} law and temperature, Work and Heat as ubiquitous components of energetics, internal energy, 1^{st} law, enthalpy, entropy principle and the concept of a potential function, free energy, the chemical potential, 2^{nd} law, applications to phase transitions and chemical equilibrium, understanding natural processes, chemical potential, coupled reactions, thermodynamics of photosynthesis, transformations as processes in an energy landscape, etc. Skills: describing natural problems in terms of energetics and spontaneity. **6)** Laws of Electromagnetism; flux and circulation, Gauss's law, Stokes theorem, Poisson equation and its solution for a few specific cases, multipole expansion. Skills: basic principles of electromagnetism. **7)** Special Theory of relativity, space time continuum and applications. **8)** Nuclear Physics: Hadrons and leptons, the structure of nucleus.

Preferred Text Books: 1) Feynman Lectures in Physics, vol.I & III by R Feynman. **2)** Schaum's Outline of Theory and Problems of Theoretical Mechanics by Murray R Spiegel. **3)** Physical Chemistry by P W Atkins. **4)** Thermodynamics, Kinetic Theory and Statistical Thermodynamics by F Sears. **5)** Concepts of Modern Physics by Arthur Beiser

Outcome: The desired outcome of the course is to generate in the students an overall excitement about the world of science; also a basic familiarity of the terminology and tools of chemical, physical and biological sciences.

SCI371 Science Lab I 0-1-4-4

Faculty:Tapan Kumar Sau + B. Prabhakar
Objective: Main objective of this laboratory course is to understand the concepts of select science topics through lab sessions.

Course Topics: 1. Introduction to Experimental Error Analysis. **2.** Geiger Counter. **3.** Polarimetry. **4.** Conductometry. **5.** Photometry. **6.** pHmetry. **7.** Kinetics of Reactions. **8.** Solution Chemistry Techniques

Outcome: his laboratory course is designed to introduce students to the bachelor level science laboratory techniques. Students completing this course are expected to learn the following: (i) hands on experience of select science topics (ii) measure and report physical quantities with appropriate precision, (iii) convert raw data to a physically meaningful form, (iv) apply appropriate methods of analysis to raw data, (v) recognize the relevance of data, (vi) work safely in the lab, (vii) adhere to instructions on laboratory safety, (viii) recognize hazardous situations and act appropriately, and (ix) recognize the applicability of scientific principles to real world situations.

CSE471 Statistical Methods in AI 3-1-0-4

Faculty: Vineet Gandhi

Course Topics: Linear Discriminant functions, Perceptrons, Perceptron Learning, Relaxation methods, minimum squared error procedures, Linear classifiers, Neural Networks: Non-linearity, Back propagation, Improving NN training, FV's as Random Variables, Densities, Classes, Sample sets and properties, Basics of Probabilities and densities, Multivariate densities, CV and properties, Bayesian Decision Theory, Discrete, Continuous, Maximum Likelihood Estimation, MAP estimation, Principal Component Analysis, Eigen Faces, Linear Discriminant Analysis and Fisher Faces, Max-Margin Classification, Kernelization, Combining classifiers, Data clustering, Clustering methods, Decision Trees, Graphical Models, Bayesian Belief Networks.

SCI331 Thermodynamics & Statistical Mechanics 3-1-0-4

Faculty: Deva Priyakumar + B. Prbhakar

Objective: To introduce students to the fundamental topics of Thermodynamics and Statistical Mechanics.

Course Topics: (A) Thermodynamics - (1) Properties of Gases: Ideal Gas, Van der Waals Gas. (2) Fundamental Laws of Thermodynamics: Work, Heat, Energy, Expansion Work, Adiabatic Changes, The Joule-Thomson Effect, Entropy, Heat Engine, Refrigerator, Carnot Cycle, Helmholtz And Gibbs Energies, (3) Phase Diagrams and Phase Transitions. (4) Thermodynamics of Mixing.

(B) Statistical Mechanics – Concepts of Probability, Microcanonical ensemble, canonical ensemble, Fluctuations, Magnetic systems, Many-particle systems

Preferred Text Books: 1) Physical Chemistry, by P. W. Atkins. 2) Physical chemistry: a molecular approach by Donald Allan McQuarrie and John Douglas Simon. 3) Physical Chemistry, by Thomas Engel and Philip Reid 4) Physical Chemistry, by G. W. Catellan. 5) F. Reif, Fundamentals of Statistical and Thermal Physics. 6) T. Hill, An Introduction to Statistical Thermodynamics.

Outcome: Students are expected to gain a better understanding of the Thermodynamics and Statistical Mechanics principles and their applications.

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Dean (Academics)