INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

An autonomous institution of the Ministry of Human Resource Development under the Government of India

IISER
THIRUVANANTHAPURAM

CET Campus,
Thiruvananthapuram - 695016, Kerala, India.
Tel : 0471 2597438, e-mail : contact@iisertvm.ac.in
www.iisertvm.ac.in

www.iisertvm.ac.in

Flash World, Tvm : 9895597438

IISER
THIRUVANANTHAPURAM

GUIDE BOOK OF
CURRICULUM AND REGULATIONS FOR
INTEGRATED MASTER OF SCIENCE (MS) PROGRAMME
2009 - 2010

www.iisertvm.ac.in

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

An autonomous institution of the Ministry of Human Resource Development under the Government of India

Contents:

1. Preamble

The Indian Institute of Science Education and Research (IISER) is an Institution conceived and established by the Ministry of Human Resources Development (MHRD) of the Government of India. The mission of the Institute is to offer postgraduate level teaching of the highest international standards to school leaving (+2) students and also to conduct frontline research leading to Ph.D. Degree, in basic sciences like Biology, Chemistry, Physics, Mathematics and other Interdisciplinary Science subjects.

The five IISERS established by MHRD are at Kolkota, Pune, Mohali, Bhopal and Thiruvanthapuram.

2. Profile of IISER-TVM

IISERT-TVM started functioning in August 2008 at the transit campus at the Department of Computer Science of the College of Engineering, Thiruvanthapuram (CET).
The Institute is residential. This means all students will reside in the Institute hostels.
The permanent campus of IISER-TVM is coming up at Vithura, about 40 km from Thiruvanthapuram City, at the foothills of the Ponmudi Hills.

3. The MS Programme

The barrier between the traditional disciplines are fast disappearing. Modern research problems span a wide range of areas. It helps to have basic training in a range of disciplines to suceed in modern research. Accordingly, IISER-TVM MS curriculum is designed to be dominantly interdisciplinary.

- The MS programme is of 10 semesters duration.
- Each academic year has 2 semesters of roughly 16 weeks each.
  - (a) Varsha Semester : August- December.
  - (b) Vasanth Semester : January- May.
- The first 2 years (i.e. the first 4 semesters) will consist of CORE courses common to all students.
- 3rd and 4th year courses will be specialized in one Major (Biology, Chemistry, Physics or Mathematics) and one or more Minors.
- The fifth year will be devoted to a thesis by research.

4. Registration

- Every student must register for the courses of a semester on the first day (registration day) of the semester.
- The courses are chosen in consultation with the student adviser and with his approval.
- Registration involves payment of the prescribed fees for the semester.
- A fine of Rs.100/- per day will be levied for late registration
- Registration is not possible after the first week of the semester.

5. Student Adviser

Every student is assigned a Faculty Adviser who will guide the student in all academic and personal matters

6. Assessment and Grading

6.1 Continuous assessment will be adopted for all courses.

Theory Course :	Assignments	: 10%
	Two Mid semester Exams	: 20 % each
	End semester Exam	: 50%
Practical Course:	10 Class experiments	: 70%
	Final Exam	: 30%

6.2 Grading: Relative grading will be adopted.

(a) The letter Grade and Grade Points are as follows:

Grade	Grade #
A	10
B	8
C	6
D	4
F	0
I	Incomplete

(b) Semester Grade Point Average (SGPA) is calculated as:

$$SGPA = \sum_i C_i G_i / \sum_i C_i$$

Where C_i = Credit for i^{th} course ; G_i = Grade point secured by the student .
Summation is over all the courses credited by the student in the semester .

c) Cumulative Grade Point Average is calculated as

$$CGPA = \sum_k C_k G_k / \sum_k C_k$$

Where C_k = Credit for k^{th} course ; G_k = Grade point secured by the student .
Summation is over all the courses credited

7. Minimum Grade and Attendance Requirements

- The minimum CGPA required for award of the MS degree is 6.

- To qualify for the MS Degree, all CORE courses must be completed successfully.

- The CORE courses of the first 2 years must be completed in a maximum of 3 years.

- The minimum CGPA required to continue in the programme at any time is 4.0. Failure to maintain the minimum CGPA in any two consecutive semesters will lead to automatic removal of the student from the rolls.

- Full attendance in all courses is compulsory. Attendance will be recorded in every class and attendance grade will appear in the grade transcripts. A student with less than 75% attendance in any course will not be permitted to take the Final Exam of that course and will be awarded an I Grade in that course. A student with I Grade has to repeat the course.

- Make up examinations may be given to those who miss the mid semester or end semester examinations due to genuine reasons as determined by the Instructor/Director.

- The student with an F grade in the core course may be given a repeat final examination. If the resulting score is above the cut-off stipulated for F grade in the course, atmost a D grade will be awarded. If not, the student must repeat the course when offered next. Two successive F grade in the same core course will result in the removal of the student from the rolls.

8. Library Regulations:

- A student may be issued two books at a time for a fortnight.
- A fine of Rs. 1/- per day for the first week of delayed return and Rs.10/- per day thereafter will be levied.
- A student who loses or mutilates a book will have to replace the book in addition to paying any extra fine that may be imposed.

9. Conduct Regulations

A.) The student must sign and submit to the Institute the following Honour Pledge at the time of registration in the Varsha semester. The pledge must be counter-signed by the parent/guardian.

IISER-TVM Student Honour Pledge

a. I promise, on my honour, that I will conduct myself in the Institute and outside , with decorum and decency befitting the high moral and ethical standards expected of the members of the National Institute, IISER TVM and follow its rules and regulations

b. I will not engage in ragging. I understand that ragging is unlawful and liable to prosecution by law enforcement authorities of the State besides any disciplinary action the Institute may take which may include dismissal from the Institute.

c. I will not engage in overt/covert sexual harassment.

d. I will not resort to any dishonest practice in examinations/assignments.

e. I will not engage in plagiarism in my writings and will acknowledge the work of other authors according to international practices.

f. I understand that violation of this pledge makes me liable to disciplinary action by the Institute.

Signature *Signature*

Student *Parent/Gaurdian*

B.) Use of mobile phones in the library, class rooms and laboratories is prohibited.

The student and his parent /guardian should sign, at the time of admission, the prescribed anti-ragging forms (See website: www.iisertvm.ac.in) as per the stipulation of the MHRD, Govt. of India.

10.Hostel Regulations:

1. Please do not make noise in the rooms, corridors and premises of the hostel especially during night.
2. Keep your rooms and premises clean and tidy. You are responsible for keeping your rooms clean.
3. Please take utmost care not to damage furniture, TV, washing machines etc.
4. Strictly avoid getting into arguments with fellow hostellites, localites and office staff.
5. Cooking inside the rooms is strictly prohibited.
6. Guests are not allowed in hostel rooms.
7. In case of any emergency (illness, accidents etc), contact the concerned warden.
8. Any overt or covert sexual/caste/religion/creed/color remark will lead to immediate removal of the offender from the institute rolls.
9. All students must reach hostel by 10.00 pm.
10. Bringing illegal substances such as explosives, drugs, narcotics and other illegal substances to the hostel /hostel premises is strictly prohibited
11. Please switch off all electrical equipments after usage
12. Please take care of your personal belongings.
13. Anti-ragging regulations of the institute have to be strictly followed in the hostels too.
14. Leaving the hostel for a day or longer need prior permission from the concerned warden.
15. Use of drugs/alcoholic beverages/tobacco products in the hostels is strictly prohibited. Smoking in public is a punishable offence in Kerala State.
16. Students should be either in the hostel or in the IISER. Prior permission from the concerned warden has to be obtained in case you need to go anywhere else. This has also to be recorded in the register kept for the purpose in the Hostel.
17. Permanent address including the phone numbers of the parent/guardian has to be given to the Warden/IISER office. Also the address has to be updated whenever there is a change due to shifting/ change of phone number of the parent etc.

11. INSPIRE Fellowship

The Department of Science and Technology Government of India has instituted the INSPIRE Fellowship available to each student of IISER. This provides Rs.5,000/- per month stipend and Rs.20,000/- for mentoring institution and for summer projects.

The fellowship is contingent upon good performance in each semester with a minimum SGPA of 6.0. If the SGPA goes below 6.0 in any semester, the stipend will be stopped and can be restarted only when the SGPA goes to 6.0 or above.

12. MOODLE and Course Feedback

MOODLE will be employed extensively in the teaching programmes. This includes course contents, assignments, quizzes, course grading, and grade transcripts. Online course feedback by students will be done for every course.

13. COURSE STRUCTURE – FOUNDATION COURSES
FIRST FOUR SEMESTERS
(core courses, common to all streams)

Table 1

COURSES / SEMESTER	BIOLOGY	CHEMISTRY	MATHEMATICS	PHYSICS	INTERDICIPLNARY	HUMANITIES/ COMP. SCI	PRACTICALS
SEMESTER I	BIO 111: CELL BIOLOGY (3103)	CHY 111: PRINCIPLES OF CHEMISTRY (3103)	MAT 111: CALCULUS AND LINEAR ALGEBRA (3103)	PHY 111: MECHANICS (3103)	IDC 111: SCIENTIFIC COMPUTING (2203)	HUM 111: READING, LISTENING AND WRITING SKILLS (0101)	CHY 112 (0031) PHY 112 (0031) BIO 112 (0031)
SEMESTER II	BIO 121: BIOCHEMISTRY (3103)	CHY 121: KINETICS AND MECHANISMS (3103)	MAT 121: MULTI VARIATE CALCULUS (3103)	PHY 121: ELECROMAG NETISM AND OPTICS (3103)	IDC 121: THERMODYNAMICS (3103)	HUM 121: HISTORY & PHIL. OF SCIENCE (0101)	CHY 122 (0031) PHY 122 (0031) BIO 122 (0031)
SEMESTER III	BIO 211: ECOLOGY AND EVOLUTIONARY BIOLOGY (3103)	CHY 211: REACTIVE INTERMEDIATES MACROMOLECULES & ELECTROCHEMISTRY (3103)	MAT 211: COMPLEX FUNCTIONS (3103)	PHY 211: INTRODUCTION QUANTUM MECHANICS (3103)	IDC 211: ELECTRONICS (2023)	HUM 211 : INTRODUCTORY PSYCHOLOGY (2001)	CHY 212 (0031) PHY 212 (0031) BIO 212 (0031)
SEMESTER IV	BIO 221: GENETICS AND MOL. BIOLOGY (3103)	CHY 221 : QUANTUM CHEMISTRY AND PHOTOCHEMISTRY (3013)	MAT 221: PROBABILITY AND STATISTICS (3103)	PHY 221: STATISTICAL MECHANICS (3103)	IDC 211: SYMMETRY AND SPECTROSCOPY (3103)	CSA 221 : COMPUTER SCIENCE (3103)	CHY 222 (0031) PHY 222 (0031) BIO 222 (0031)

LTPC: L = Lecture, T = Tutorial. P = Practicals, C = Credit; IDC = Interdisciplinary Course; HUM = Humanities

Notes

14. Course Syllabi

Note:- Course Code : XYZ ysc
where XYZ is short for the subject , y = year, s = semester and c = course number

14.1 BIOLOGY

Theory Courses

BIO 111 Cell biology [3103]

1.Chemical components of life

Overview on life and organisms, sugars, lipids, saccharides, glycoproteins, nucleotides and nucleic acids, DNA, RNA, chromosome, amino acids, peptide bonds, proteins (including protein structure at very basic level)

2.Cell as unit of life

Development of cell theory, Prokaryotes vs eukaryotes, single cell to multicellular organism, prokaryotic cell: structure, cell wall, and related molecules, flagella, motility, vesicles, inclusion bodies, endospores. Eukaryotic cell: structure of animal and plant cells, serial endosymbiosis theory, virus, viroids, and prions.

3.Cell Membrane:

Diffusion, osmosis, membrane transport, ion channels and electrical properties.

4.Cell architecture

Cytoskeleton: Microtubules, actin, intermediate filaments, motor proteins, extracellular matrix

5.Organelles

Cell nucleus, ER, golgi, centrosome, cilia-flagella, endosomes and lysosomes, mitochondria and plastids.

6.Birth and death

Cell cycle, mitosis & meiosis, cellular death.

BIO 121 Biochemistry[3103]

1.Molecules and energetics of life

Primary, secondary, tertiary and quaternary structure of proteins, Ramachandran plot, Enzymes: classifications, Kinetics,

2.Molecular pathways of protein synthesis

DNA replication, repair, and recombination, molecular pathways of protein synthesis, molecular cloning and gene expression

3.Biochemical pathways

DNA, RNA metabolism, protein modification, glycolysis, amino acid and fatty acid biosynthesis

4.Cytoskeleton regulation

Microtubules, actin polymerization and their regulation, regulation of intermediate filaments

5.Cell signaling

Messengers and receptors: structure-function, biochemical pathways of signal transduction cascades.

6.Energy transduction and Bioenergetics

Mitochondria, ATP, electron transport, gap junctions.

BIO 211 Ecology and Evolutionary Biology[3103]

1.Introduction to science of ecology
2.The Physical environment-Aquatic and terrestrial environments
3.Ecosystems and biomes
4.Energy in ecosystems, food webs, cycling, succession and nutrient pathways
5.Introduction to evolutionary biology
6.Life histories of plants and animals
7.Behavioural ecology
8.Plant and animal ecology
9.Population ecology including population processes such as growth,structure,regulation and dynamics
10.Community ecology including species interactions and ecological webs
11.Biodiversity and conservation biology
12.Biogeography and global ecology

Textbooks:

1.Manuel E Molles,Jr.2005. Ecology: Concepts and applications
2.Douglas J Futuyma.Evolution(Second Edition)
3.Herrara CM and Olle Pellmyr. 2002. Plant-animal Interactions: An evolutionary Approach
4.Lehninger, Principles of Biochemistry(Fourth edition)

Laboratory Courses

BIO 112 Biology Lab I [0031]

1. Microscopic observation of bacteria, yeast, plant and animal cells
2. Study of osmosis in red blood cells
3. Study in membrane permeability using various alcohols
4. Mitosis, Meiosis: Microscopic view
5. Cell count by hemocytometer

BIO 122 Biology Lab II [0031]

1) Estimation of reducing sugars by DNSA method
2) Estimation of iodine number of lipid
3) Preparation of buffers, pH measurement
4) Estimation of DNA
5) Estimation of proteins
6) Enzyme assay and kinetics
7) Agarose gel electrophoresis of DNA
8) Genomic DNA isolation
9) Plasmid isolation
10) Protein expression and SDS-PAGE gel electrophoresis of proteins
11) Restriction digestion of bacteria
12) Transformation of bacteria

BIO 212 Lab III [0031]

1. Understanding some key concepts in ecology, evolution and behaviour through short duration field and lab studies.
2. Approaches to formulating questions for ecological studies
3. Population estimation through sampling. What is sampling ∑Why sample ∑ How much to sample ∑Choosing the most appropriate method and the pitfalls of adopting an inappropriate sampling design. Implications of sample sizes and sampling error.
4. Experimental design in ecology
5. The study and applying bio-statistics in the analysis of ecological data
6. Scientific report writing

14.2 CHEMISTRY

Theory Courses

CHY 111 Principles of Chemistry [3103]

1. Periodicity and Atomic Structure: Outer Electronic Configuration and properties of elements- Periodicity- Classification into metals, nonmetals, insulators, inert gases, The quantum mechanics of binding, energy levels.

2. Concepts of Chemical Bonding: Structure and bonding, VSEPR theory, Molecular Orbital Theory, Concepts of reactivity, Acids and Bases, Redox reactions, Hard-Soft Acid Bases (HSAB theory), Bonding between elements-ionic, Covalent, Metallic, Hydrogen bonding, van der Waals, Multi-centered bonding, Rare-gas chemistry.

3. Chemistry of Elements: Main group elements, Structure-property-reactivity, Transition metal chemistry, Coordination chemistry, Introduction to crystal field theory.

5. Concepts in Organic Chemistry: Stereochemistry, Optical activity and Conformational analysis.

Structure and Reactivity: Inductive, mesomeric and steric effects; Aromaticity and Stability, Linear free energy relationships, Nucleophilic addition reactions of aldehydes and ketones and related name reactions

7. Modern Materials: New forms of Carbon, Metal and Semi-conductor nanoparticles

Textbooks:

1. D. A. McQuarrie and J. D. Simon, Physical Chemistry : A Molecular Approach, Viva Books (1997) [Indian Low-Priced Edition].
2. J. E. Huheey, R L Keiter and E A Keiter, Inorganic Chemistry, Harper Collins (1993) [Indian Low-Priced Edition].
3. A. K. Das, Fundamental Concepts of Inorganic Chemistry, CBS, New Delhi (2006)
4. D. Nasipuri, Stereochemistry of Organic Compounds: Principles and Applications, Oscar Publications (1994).
5. P. Sykes, A Guidebook to Mechanism in Organic Chemistry, Addison-Wesley.

CHY 121 Kinetics and Mechanisms [3103]

1. Kinetics and Rate processes: Basic kinetic concepts, analysis of kinetic results-theoretical and experimental methods, energy of activation, theories of reaction rates, thermodynamic and kinetic stability, reactions in solutions and surfaces, enzyme catalysis, parallel, consecutive and oscillatory reactions, Electron transport in biomolecules.

2. Coordination Chemistry: Bonding, Crystal Field Theory and Jahn-Teller Theorem, Spectrochemical Series, Molecular Orbital Theory of complexes, Spectra and Magnetism, Orgel diagrams, Charge-Transfer spectra, Curie-Wiess Law, Neel temperature, anti-ferromagnetic interactions in complexes, super-exchange and double-exchange.

3. Organometallic Chemistry: 18-electron rules, Counting of electrons in complexes, heptacity, Metal-Carbonyl complexes, Polynuclear Carbonyls, Isolobal analogy, Heteroboranes, Wade's n + 1 Rule, Jemmis mno rules, Nitrosyl Complexes, Carbene, Carbyne and Carbide Complexes, Ziese's salt, Metallocenes, Alkene and Alkyne complexes, Cyclobutadiene and cyclo-octatetraene complexes, Organometallic Compounds of main group elements.

4. Reaction Mechanisms: Substitutions, additions and eliminations in organic and inorganic chemistry, Electrophilic aromatic substitutions and related name reactions

Textbooks:

1. Inorganic Chemistry: Principles of Structure and Reactivity (4th Edition) by James E. Huheey, Ellen A. Keiter, and Richard L. Keiter, Prentice-Hall (Indian Edition).
2. Inorganic Chemistry (Fourth Edition), Peter Atkins, Tina Overton, Jonathan Rourke, Mark Weller, and Fraser Armstrong, Oxford University Press.
3. The Organometallic Chemistry of the Transition Metals. R. H. Crabtree, Wiley, New York, 1988.
4. Principles and Applications of Organotransition-Metal Chemistry, Collman, Hegedus, Norton, and Finke, 1987.
5. Chemical Kinetics (3rd Edition), Keith J. Laidler, Prentice-Hall.
6. F. Basalo, R. G. Pearson, Mechanisms of Inorganic Reactions- A Study of Metal Complexes in Solutions, NY, J. Wiley.

CHY 211 Reactive Intermediates, Macromolecules and Electrochemistry [3103]

1. General introduction to organic reactions and reactive intermediates
Various types of reactions in organic chemistry: substitution, elimination, addition, oxidation and reduction reactions. Formation, structure, stability and fate of various reactive intermediates: carbocations, carbanions, carbenes, nitrenes, benzynes and free radicals.

2. Thermodymanic and kinetic aspects of the following reactions; use of various spectroscopic tools for understanding their mechanism and characterization of reactive intermediates

(1)Nucleophilic substitution and elimination reactions:
Nucleophilic substitution reactions (SN1, SN2 and SNi) and elimination (E1, E2 and E1cB) reactions; stereochemical considerations; neighboring group participation; Hofmann and Saytsev rules.

(2) Electrophilic addition reactions:
Electrophilic addition reactions to alkenes and dienes; regio- and stereoselectivity.

(3) Electrophilic aromatic substitution reactions:
Benzene and its reaction with electrophiles; role of functional groups.

(4) Nucleophilic aromatic substitution reactions:
Electrophilic alkenes; Nucleophilic aromatic substitution-diazonium compounds; benzyne mechanism; allylic compounds.

(5) Oxidation and reduction reactions in organic chemistry.

(6) Radical reactions in organic chemistry.

3. Rearrangements in organic chemistry
Nucleophilic, electrophilic and free radical rearrangements.,Carbon to carbon migration: Wagner-Meerwein rearrangement: Pinacol rearrangements; dienone-phenol rearrangement; Favorskii rearrangent; benzilic acid rearrangement.,Carbon to nitrogen migration:Hofmann rearrangement; Curtius rearrangement; Lossen rearrangement; Schmidt reaction and Beckmann rearrangement,Carbon to oxygen migration: Baeyer-Villiger rearrangement

Textbooks:

1. Organic Chemistry, R. T. Morrison and R. N. Boyd, 6th Edition, Prentice Hall, 1992.
2. A Guidebook to Mechanism in Organic Chemistry, P. Sykes, Addison-Wesley, 1996.
3. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structures, M. B. Smith, Jerry March, 6th Edition, Wiley Interscience, 2007.
Organic Chemistry, J. Clayden, N. Greeves, S. Warren, P. Wothers, Oxford University Press, 2000.

Laboratory Courses

CHY 112: Chemistry Lab I[0031]

1. Titrimetric Analysis
Experiment No 1: Titration of Antacids
Experiment No 2: Estimation of Calcium in milk powder

2. Inorganic Preparations
Experiment No.3: Preparation of potash alum from scrap aluminium
Experiment No.4: Preparation of tetrammine Cu (II) sulphate monohydrate
Experiment No.5: Preparation of hexamine nickel (II) chloride

3.Spectrophotometry
Experiment No 6: Determination of the concentration of Fe (II) and Fe (III) in Iron Tablets
Experiment No 7: Estimation of phosphoric acid in a cola-drink by mo-blue method
Experiment No 8: Estimation of nickel in hexamine nickel (II) chloride

4. Organic Preparations
Experiment No.9: Preparation of Aspirin
Experiment No.10: Preparation of Paracetamol

5. Chromatography
Experiment No.11: Paper chromatography and separation of metallic ions ii.
Experiment No.12: Identification of Analgesic drugs

Experiment No.13: Chromatography and spectroscopy of plant pigments

6. Polymer Analysis
Experiment No.14: Preparation of polystyrene and determination of its molecular weight by viscosity average method

CHY122: CHEMISTRY LAB I [0031]

A)OXIDATION REDUCTION TITRATION
(i) Determination of calcium and magnesium in the given solution
(ii) Ferrous and ferric iron in iron ore
(iii) Determination of ascorbic acid
(iv) Determination of dissolved oxygen in water

B)DETERMINATION OF PARTIAL MOLAR PROPERTIES
(v) Determine the prtial molar volume of given liquid mixture

C)Chemical Kinetics
(vi) Bromination of acetone
(vii) Rate constant of hydrolysis of ester catalyzed by acid
(viii)Velocity constant of hydrolysis of ethyl acetate by sodium hydroxide
(ix) Determination of order of reaction
(x) Kinetics of the reaction between potassium persulphate and Potassium iodide
(xi) The clock reaction

D)Organic Preparation
(xii) The Grignard Reaction: Preparation of Triphenylmethanol

CHY122: CHEMISTRY LAB II [0031]

A)OXIDATION REDUCTION TITRATION
(i) Determination of calcium and magnesium in the given solution
(ii) Ferrous and ferric iron in iron ore
(iii) Determination of ascorbic acid
(iv) Determination of dissolved oxygen in water

B)DETERMINATION OF PARTIAL MOLAR PROPERTIES

(v) Determine the prtial molar volume of given liquid mixture

C)Chemical Kinetics

(vi) Bromination of acetone

(vii) Rate constant of hydrolysis of ester catalyzed by acid

(viii)Velocity constant of hydrolysis of ethyl acetate by sodium hydroxide

(ix) Determination of order of reaction

(x) Kinetics of the reaction between potassium persulphate and Potassium iodide

(xi) The clock reaction

D)Organic Preparation

(xii) The Grignard Reaction: Preparation of Triphenylmethanol

CHY 212 CHEMISTRY LAB III [0031]

A) PHASE DIAGRAM

1. Phenol – water system

(a) Determine the mutual solubility curve phenol and water and hence the consolute point

(b) Determine the composition and the amounts of the layers obtained by mixing 50 g of phenol with 50 g of water at 400C.

(c) Determine the critical solution temperature of phenol and water in presence of

2% of Potassium chloride, 0.5% of naphthalene and 1% of succinic acid.

(d) Determine the concentration of aqueous KCl solution by studying the mutual solubility of phenol and water in presence of varying amounts of the salt.

Partition / Distribution coefficient

2. (a) Determine the distribution coefficient of iodine between carbon tetrachloride and water at a given temperature.

(b) Study the distribution of benzoic acid between benzene and water

3. (a) Determine the equilibrium constant for the reaction KI + I2 KI3

(b) Determine the formula of complex ion formed between the cupric ion and ammonia (cupurammonium ion) by distribution method.

Solid Liquid system

4.(a) Determine the phase diagram of Naphthalene and biphenyl system

(b) Determine the phase diagram of o-nitrophenol and p-toluidine system

(c) Determine the phase diagram of diphenylamine and benzophenone system

Three component liquid system

5. (a)Determine the triangular phase diagram of acetic acid, chloroform and water.

b) Electrolytic Conductance

6. (a) Determine the equivalent conductance of weak electrolyte at different concentrations and hence verify Ostwald's dilution law

(b) Determine the equivalent conductance of strong electrolyte (KCl, NaCl, AgNO3, HCl etc.) at several concentration and verify Onsagar's equation

7.Conductometric titration

(a) Determine the end point of the following titrations by conductometric method.

1. 0.01M HCl with NaOH
2. 0.01M HCl with NH4OH
3. 0.01M CH3COOH with NaOH
4. 0.01M CH3COOH with NH4OH
5. 0.01M BaCl2 with K2SO4

(b) Determine the composition of mixture of

1. Acetic acid and hydrochloric acid
2. Hydrochloric acid and oxalic acid
3. Acetic acid and oxalic acid.

(c) Estimate the concentration of H2SO4, CH3COOH andCuSO4.5H2O in a given solution by carrying out conductometric titration with NaOH

C) Electromotive force of cells

8. (a) Determine the heat of reaction and equilibrium constant of the reaction between metallic zinc and lead nitrate solution.

(b) Determine the heat of reaction, entropy change and equilibrium constant of the reaction between metallic zinc and Cu2 + ions in the solution.

(c) Determine the transport number of Ag + and NO3- in solution using 0.1 and 0.01M AgNO3 solutions.

9. Potentiometric titrations

(a) HCl > < NaOH using quinhydrone as the indicator electrode

(b) 0.1M orthophosphoric acid > < 0.5 M NaOH

(c) Estimate the unknown mixture of KCl, KBr and KI solution potentiometrically

(d)Titrate ferrous ammonium sulphate against potassium dichromate (potassium permanganate) potentiometrically and hence determine the formal redox potential of ferrous- ferric system.

10 .Organic Preparations

a. Convert acetanilide to p-nitroaniline
b. Preparation of dibenzalacetone
c. Conversion of acetanilide to p-bromoaniline
d. Preparation of methyl orange.

14.3 MATHEMATICS

Theory Courses

MAT 111 Calculus and Linear Algebra [3103]

1.Calculus:

Real Number System: Introduction to the real number system.
Sequence and series: Convergence of a sequence, Cauchy's criterion; limit of a sequence, supremum and infimum; absolute and conditional convergence of an infinite series, tests of convergence, examples.

Continuity: Formal definition, continuity and discontinuity of a function at a point; left and right continuity, examples of continuous and discontinuous functions, intermediate value theorem, uniform continuity.

Differentiation: Definition and basic properties, Rolle's theorem, mean value theorem, Leibnitz's theorem on successive differentiation, Taylor's theorem, Partial differentiation; applications.

Integration: Riemann integral viewed as an area, partitions, upper and lower integrals, existence of the Riemann integral, basic properties, Fundamental Theorem of integral calculus, integration by parts, applications.

2.Linear Algebra:

Definition of a linear vector space and examples; linear independence of vectors, basis and dimension; scalar product, orthogonal basis, Gram-Schmidt orthogonalization process; linear operators; orthogonal, unitary and hermitian matrices, eigen values and eigen vectors of a matrix and matrix diagonalization.

Textbooks:

1. G. B. Thomas and R. L. Finney, Calculus and Analytic Geometry, 9th edition, Pearson Education, New Delhi, 2005.
2. E. Kreyszig, Advanced Engineering Mathematics, 8th edition, Wiley & Sons, 2006.
3. S. Lang, First Course in Calculus, 5th edition, Springer (India), New Delhi, 2006.
4. W. Rudin, Principles of Mathematical Analysis, 3rd edition, McGraw-Hill India, 1953.
5. Apostol, Calculus, Vol. 1, 2nd edition, John Wiley, New York, 2006.
K. Hoffman, Linear Algebra, 2nd edition, Pearson Education, New Delhi, 2006

MAT 121: Multi Variate Calculus and Group Theory [3103]

1. Differential Equations

First order differential equations – examples, the brachistochrone problem, Homogeneous equations and exact solutions, Integrating factors, Linear first-Order equations with examples, Second order linear homogeneous differential equations; the Wronskian and the linear independence of solutions; Equations with constant coefficients; General solution of linear second order inhomogeneous equations, Picard's theorem and applications.

2. Calculus of Functions of Several Variables

Partial derivatives, Chain rule, Implicit dfferentiation, Directional derivatives, gradient vectors and the tangent plane, Maxima, minima and saddle points, Constrained optimization and the method of Lagrange multipliers.

3.Group Theory

Definition and examples of groups, Abelian and cyclic groups, Subgroups, Cosets, Laplace's theorem , Normal subgroups and Quotient groups,

Homomrphisms and isomorphisms, Automorphisms, Permutation group.

Textbooks:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson Education, New Delhi, 2005.
2. S. Lang, Calculus of Several Variables, Springer, 3rd Edition, 1999.
3. E. Kreyszig, Advanced Engineering Mathematics, 8th Edition, Wiley & Sons, 2006.
4. W.E. Boyce and R.C. Diprima, Elementary Differential Equations and Boundary Value Problems, 8th Edition, Wiley & Sons, 2004.
5. I. N. Herstein, Topics in Algebra, 2nd Edition, Wiley and Sons, 1996

References:

1. G.F. Simmons and S.G. Krantz, Differential Equations: Theory, Technique and Practice, Tata McGraw Hill, New Delhi, 2006.
2.A.E. Taylor and W.R. Mann, Advanced Calculus, 3rd Edition, Wiley & Sons, 1983.

MAT 211 Complex Functions[3103]

1.Complex Numbers and Complex Plane: Complex numbers, arithmetic operations, conjugates, modulus, polar representation, integral powers and roots, Geometric representation of complex numbers, spherical representation, complex plane, curves and domains in the complex plane.

2.Analytic Functions: Complex valued functions, functions as mapping or transformations, certain mappings like etc., limits, continuity, differentiability, analytic functions, C-R equations, harmonic function.

3.Elementary Functions: Complex exponential function, complex logarithm, complex exponents, trigonometric and hyperbolic functions, inverse trigonometric and hyperbolic functions.

4.Complex Integration: Path integral and its properties, Cauchy's theorem (without proof), Cauchy's integral formula.

5.Series Representation: Zeros and singularities of analytic function, Power series, Taylor series, Laurent series.

6.Residue Theory: Residue theorem (without proof), evaluation of real integrals.

7.Conformal Mapping: Conformal mapping, bilinear transformation.

Textbooks:

1. Ahlfors, Complex Analysis
2. Churchill and Brown, Complex Analysis
3. Mathews and Howell, Complex Analysis for Mathematics and Engineering

14.4 PHYSICS

Theory Courses

PHY 111 Mechanics [3103]

Introduction to essential mathematical tools.

1.Newton's laws-a recapitulation:Structure and validity of the laws. The concept of inertial reference frames and Galilean relativity. Non-inertial frames and pseudoforces.

2.Systems in one dimension:Conceptual issues. Illustrations of various methods of solving the EOMs. Work energy theorem and energy conservation in ID motion. The use of potential energy graphs to understand motion. The small amplitude approximation and oscillations: The simple harmonic oscillator; the damped oscillator; the forced harmonic oscillator; nonlinear oscillators.

3.Motion in three dimensions:Equations of motion in Cartesian and Polar Coordinates. The work energy theorem in 3D; conservative and non-conservative forces; force as the gradient of potential energy. Conservation of angular momentum for a point particle. Applications: The projectile; charged particle in a uniform electromagnetic field. Central force field motion; equations for the orbit. The Kepler problem. The effective potential and the stability of circular orbits.

4.Systems of particles:Conservation laws for linear momentum, angular

momentum and energy. Center of mass. The concept of equivalent forces. Collisions. Two-body systems and the concept of reduced mass. Coupled oscillations.

5.Rigid bodies:The angular velocity vector. Rotating reference frames and pseudo-forces. The moment of inertia tensor: Connection between angular momentum and angular velocity; brief discussion on scalars and vectors; calculation of moment of inertia for simple bodies; principal axes.
6.Special Theory of Relativity:The principle of relativity. Lorentz transformations. Kinematic effects of STR. The concept of 4-vectors. The energy-momentum 4-vector. Applications.

Textbooks

1. C.Knight, W.D. Ruderman, M.A. Helmholz, C.A. Moyer and B.J.Kittel; Berkeley Physics Course: Vol. I-Mechanics; McGraw-Hill (1965).
2. D.Kleppner and R.Kolenkow : An introduction to Mechanics, McGraw-Hill Science/Engineering/Math (1973).
3. R.Feynman, R.B.Leighton and M.Sands, Feynman Lectures in Physics – Vol.I, Addison Wesley (2005).
4. J.R.Taylor, Classical Mechanics, University Science Books (2005).
5. L.D. Landau and E.M.Lifschitz. Course of theoretical physics Vol-Mechanics, Butterworth-Heinemann: 3rd edition (1982).

PHY 121: Electromagnetism and Optics [3103]

1. Electrostatics
Coulomb's law and Gauss's law Simple applications.Differential form of the Gauss's law.Electrostatic potential,electrostatic energy Calculation for some simple cases.Conductors.Surface charges induced on a conductor. Solutions of Poisson's and Laplace's equations.Method of images.Solution by the method of separation of variables in cartesian and spherical polar coordinates.Potential due to an arbitrary charge distributation.Monopole and dipole terms.Electrical field and potential due to a point dipole.Dipole in an electric field.

2. Magnetostatics.
Biot - Savart and Ampere's laws.Ampere's law in differential form.Magnetic vector potential.Determination of magnetic fields for simple cases. Energy in a magnetic field.

3. Current electricity.
Electromotive force.Ohm's law. Motional emf. Electromagnetic induction.Faraday's law.Self inductance and mutual inductance.Impedance.LCR circuit.
4. Electrodynamics
Maxwell's equations. Equation of continuity.Poynting's theorem. Electric and magnetic fields in matter.Fields D and H.Constitutive relations .Linear and nonlinear media.

5. Electromagnetic Waves
EM waves in vacuum and in a dielectric medium. Boundary conditions on an interface. Reflection and transmission at an interface. Conducting surface.

6. Optics
Wave nature of light.Interference.Young's double slit , Michelson's interferometer.Concept of coherence.Diffraction. Fraunhofer and Fresnel cases.Fraunhofer diffraction by single and double slits.Fresnel zones. Polarization of light.

Textbooks:

1. D.J.Griffths : Introduction to Electrodynamics.
2. E.M Purcell : Berkeley Physics course. Vol 2. Electricity and Magnetism, McGraw Hill
3. R.P Feynman, R.B.Leighton and M.Sands: Feynman Lectures in Physics Vol 2 Addison- Wesley
4. E. Hecht : Optics Addison - Wesley (2001).
5. F.A. Jenkins and H.E. White: Introduction to Optics. Mc Graw Hill (2001)
6. A.K.Ghatak : Introduction to Modern Optics. Mc Graw Hill.
7. A.K.Ghatak : Optics Tata- Mc Graw Hill.

PHY211 Introduction to Quantum Mechanics[3103]

1.Quantum kinematics The state vector, Quantum kinematics versus classical kinematics. The Dirac Bra and Ket notation. The principle of superposition , A

quick and ready example: the quantum two state system. The Stern-Gerlach experiment. The spin quantum number (to be revisited later) ,The Hilbert space and some general properties of linear vector spaces. Rays and vectors in Hilbert space. Normalization. Basis vectors. ,The example continued: Pauli spin matrices. Noncommutating operators and observables. The uncertainty principle. ,Operators, eigenvalues, eigenvectors, observables and expectation values (a bit of linear algebra) ,Quantum amplitudes, probabilities and the Born rule. Measuring a quantum system ,Other examples: Polarized photons. The double slit experiment. Quantum entanglement., A basis labeled by a continuous parameter and the wave function. The position and momentum bases. Fourier transform. Delta function normalization. Function spaces. The uncertainty principle revisited. The probability current and the continuity equation.

2.Quantum Dynamics The Schrdinger equation. The Hamiltonian and the idea of generators. Finite time evolution and unitary transformations. Properties of unitary transformations. Time evolution of expectation values. Dynamics in the two state example: spin precession.The Heisenberg picture. Commutation relations. The equivalence of the Heisenberg and Schrödinger pictures. Not really dynamics: the time independent Schrödinger equation. Stationary states. Examples: particle in an infinite square well and particle in a finite square well. Scattering off a potential barrier. Quantum tunneling. The Quantum Harmonic Oscillator and operator methods. Raising and lowering operators. Zero point energy. Solving the Schrödinger equation and finding the wave functions. Connecting the operator methods and the differential equation based calculations.

3.The Schrdinger equation in three dimensions The Schrdinger equation in spherical coordinates. Separation of variables. The radial equation and energy quantization. The angular equation, spherical harmonics and introduction to quantized angular momentum. Spin. Addition of angular momentum. The Hydrogen atom. The spectrum, the quantum numbers and the wave functions. Orbitals. Extension to other atoms and connection to Chemistry. Looking back for a historical perspective: Atomic spectra. deBroglie waves. Bohr's quantization condition.

4.Identical particles Two particle wave functions. Bosons and Fermions. Symmetrization and anti-symmetrization of the wave function. Exchange forces and chemical bonds. Fermions and the Pauli exclusion principle. The Helium atom. The periodic table of elements. Hund's rules. Quantum statistical mechanics. Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein distributions. The black body spectrum and coming back to the beginning: Planck's hypothesis.

5.Path Integrals Revisiting the double slit experiment and making it a multi-slit experiment. Interference between the paths. The transition amplitude and the propagator. Computing the transition amplitude for short time intervals. Putting the short time transition amplitudes together into a path integral. Properties of the path integral. Evaluation of the path integral for the case of a free particle. The path specified by the principle of least action emerging as the natural one in the classical limit.

Textbooks:

1. D. J. Griffiths, Introduction to quantum mechanics, Benjamin-Cummins (2004)
2. J. S. Townsend, A modern approach to quantum mechanics, University Science Books (2000)
3. J. J. Sakurai, Modern quantum mechanics Addison-Wesley (1994)
4. A. Peres, Quantum theory: concepts and methods, Kluwer (2002)
5. R. P. Feynman, The Feynman lectures on physics, Volume 3, Narosa (2007)

Laboratory Courses

PHY 112 Experiments in Mechanics[0031]

1. Simple Pendulum
2. Common Balance
3. Compound Pendulum
4. Sonometer
5. Moment Of A Force
6. Meldes' String
7. Projectile Motion
8. Conservation Of Momentum
9. Centripetal Force
10. Newton's Laws
11. Ballistic Pendulum
12. Conservation Of Energy

PHY 122 Experiments in Optics [0031]

1. Convex Lens
(a) 1/f = (1/u) + (1/v)
(b) u-v graph
(c) 1/u -1/v graph
(d) f = (D2-d2)/4D

2. Concave Mirror
(a) 1/f = (1/u) + (1/v)
(b) Normal Incidence
(c) u-v graph
(d) (1/u)-(1/v) graph

3. Spectrometer – prism
(a) Angle of prism.
(b) Angle of minimum deviation: Find n.

4. Spectrometer – Grating
(a) Normal Incidence.

5. Centripetal Force
6. Ballistic Pendulum
7. Conservation of momentum
8. Conservation of Energy
9. Potentiometer
10. Uniform Bending

PHY212: Experiments in Physics[0031]

1. Newton's Ring
2. Diffraction at slits
3. Michelson Interferometer
4. Determination of e/m of an electron
5. Hall Effect
6. Four-probe apparatus
7. Magnetic field along the axis of a circular coil
8. Deflection Magnetometer

14.5 HUMANITIES

Theory Courses

HUM 111 Reading, Listening and Writing Skills [0101]

Functional English(Basic Level): Reading,Writing, Listening and Speaking

HUM 121: History and Philosophy of Science [0101]

The aim of this course is to introduce some of the important problems concerning scientific knowledge. This course includes discussion on demarcation principle (science and pseudoscience distinction) and analyses central notions of science such as Explanation and Scientific Law. This course also focuses on competing positions about scientific method and scientific realism. This course aims at introducing philosophical issues about scientific knowledge and prepares students for advanced level courses in philosophy of science.

Science and Pseudo-Science
Inductivism and the Problem of Induction
Scientific Explanation
Inference to the Best Explanation
Laws of Nature
Method of Science
Realism and Instrumentalism
Scientific Experiment

Textbooks:

1. Bird, A. (1998) Philosophy of Science, London & New York: Routledge.(Indian edition is available)
2. Chalmers, A. (1982) What is this thing called Science ∑Second edition. Hackett Publishing Company. Inc. Indianapolis.
3. Okasha, Samir. (2002) Philosophy of Science: A Very Short Introduction. Oxford: Oxford University Press.
4. Rosenberg, Alexander (2000) Philosophy of Science: A Contemporary Introduction, London; New York: Routledge
Ladyman, James. (2002) Understanding Philosophy of Science, London: Routledge.

HUM 211 Introduction to Psychology [2001]

1.Introduction to Psychological Science: Definition - Goals – Early school of thoughts-Current perspectives-Major sub fields- Research Methods

2.Perception:Perceptual processes - Perception of form, pattern or objects-Principles of perceptual grouping – Perception of depth or distance Perception of motion - Perceptual Constancies – Illusion: Types of illusions

3.Learning:Nature of learning -learning paradigms: Classical conditioning, Operant conditioning, Observational learning,Complex learning

4.Memory:Information processing model of memory – Basic memory systems: Sensory Memory, Short-Term Memory & Long-Term Memory–Forgetting-Improving Memory

5.Intelligence: Nature of intelligence; Theories and models- Assessment of intellectual abilities

6.Motivation and Emotions: Nature and Theories of Motivation- Classification of motives-Physiological, cognitive correlates and theories of Emotions –Expression of emotion

7.Stress and Coping: Nature and Causes of stress- Characteristic of stressful events-Effects of stress - Coping skills- Managing stress

8.Personality:Concept of personality, Major approaches to the study of personality, Assessment of Personality

Textbooks:

1. Atkinson &Hilgard'sIntroduction to Psychology (14th edition) by Smith Edward E, Fredrickson Barbara, Loftus Geoffrey and Nolen-Hoeksema Susan. Thomson: Wadsworth
2. Psychology (5th edition) by Baron, R.A. Allyn& Bacon
3. Exploring Psychology (7th edition) by David G. Myers. Worth Publishers
4. Introduction To Psychology: Gateways To Mind And Behavior(11th edition) by Dennis Coon and John O. Mitterer Wadsworth Publishing Company.

14.6 INTERDISCIPLINARY COURSES

IDC 111 Scientific Computing [2203]

1. Introduction to computers & computations.
2. Principles of programming and scientific computing.
3. Introduction to Mathematica/Matlab/Scilab.
4. Applications from Chemistry, Physics and Mathematics involving:
   - Regression analysis: polynomial and spline fitting of data.
   - Systems of simultaneous equations
   - Differential equations: Classical dynamics (planetary motion, pedulum)
   - Schrodinger equation (harmonic oscillator, hydrogen atom)
   - Matrix algebra: Secular equations, Huckel theory for cyclic polyenes.
   - Difference equations: population biology; logistic equation, chaos, attractors.
   - Random Phenomena: random walk, polymer growth, modeling epidemic.
   - Spectral analysis: Fourier transform
5. Graphics: 2D and 3D plots, animations

Textbooks:

1. A first course in scientific computing, Rubin H Landau, Princeton University Press, 2005.
2. Introduction to Computational Science. Modeling and Simulation for the Sciences. Angela B Shiflet, Princeton University Press.
3. Scientific Computing: An introductory Survey. Michael T. Heath, McGraw-Hill, NY.
4. Scientific Computing with MATLAB, Alfio Quarteroni and Fausto Saleri, Springer 2003.
5. Guide to Scientific Computing, Peter R Turner, Macmillan Press 2000.
1. Exploring Numerical Methods: An introduction to Scientific Computing using MATLAB Peter Linz.
2. First Course in Mathematical Modeling, Frank R. Giordano, Mauarice D. Wei, William P. Fox, Vikas Publishing House.
3. Computational Science, D. Kiryanov and E. Kiryanova, Firewall Media, Bangalore, 2007.

IDC 121: Thermodynamics [3103]

1. **The scope and methods of thermodynamics:** Macroscopic description of the state of a system, Extensive and intensive properties, Thermal equilibrium between systems, Zeroth Law of Thermodynamics, Concept of thermal equilibrium and temperature in classical physics, Adiabatic and diathermal walls, Temperature Scales.

2. **The First Law of Thermodynamics:** The concept and definition of work, General compression and expansion, General form of expressions for reversible, irreversible and quasi-static work, Joule's Experiment, Formulation of the 1st law of thermodynamics for a closed system, Concept of internal energy, Conservation of energy in a cycle, Perpetual motion of the 1st kind, Reversible transfer of heat, Definition of specific heat capacity and enthalpy, Adiabatic and isothermal processes. Calculation of pressure, kinetic interpretation of temperature; mean free path; distribution of molecular speeds; equipartition of energy. Microscopic versus macroscopic points of view; temperature; thermodynamic systems and thermodynamic equilibrium; Isothermal and adiabatic changes of ideal and real gases.

3. **Reversible and irreversible processes:** The Second Law of thermodynamics. Carnot cycle and the Kelvin temperature scale; Clausius' theorem; entropy and its physical interpretation; entropy change for simple processes; thermodynamic functions: Helmholtz free energy, Gibbs free energy and enthalpy; conditions of equilibrium; Maxwell's relations and their applications. Equilibrium between two phases; general equilibrium conditions; the Clausius- Clapeyron equation; phase transformation of pure substances and mixtures; dilute solutions; chemical equilibrium; the chemical potential.

4. **The Third Law of thermodynamics :** Perfect crystal, The unattainability of absolute zero, Application in magnetic and charge ordering of materials, Adiabatic demagnetization, localization and defects.

5. **Thermodynamics of Chemical and Biological Systems:** Non-equilibrium Thermodynamics: Flow of energy in biological systems, molecules of energy in life, storage of energy, the hydrogen economy, Onsager reciprocal relations, Bose-Einstein Condensation, Negative temperature, Thermodynamics of small systems and molecular machines.

Textbooks:

1. M. W. Zemanski, Heat and Thermodynamics MacGraw-Hill, New York, 1968.
2. E. Fermi, Thermodynamics, Dover.
3. M. N. Saha, B. N. Srivastava, A Treatise on Heat. (Allahabad, The Indian Press).
4. Chemical Thermodynamics, R. P. Rastogi, R. R. Mishra, Vikas Publishing.
5. Non-Equilibrium Thermodynamics, S. R. De Groot, P. Mazur, Dover.
1. Nonequilibrium Thermodynamics, 2nd Edition: Transport and Rate Processes in Physical, Chemical and Biological Systems, Yasar Demirel, Elsevier.
2. Molecular driving forces: Statistical Thermodynamics in Chemistry and Biology, K.A. Dill and S. Broomberg, Routledge, 2002

IDC 211 Basic Electronics [2023]

1. Study of forward and reverse biased characteristics of the p-n diode and the Zener diode. Design of different simple logic gates such as OR and AND using diodes.
2. Study of DC regulated power supply with and without different types of filters.
3. Measurement of the input and output characteristics of a NPN transistor.
4. Determination of the value of hfe.
5. Study the uses of transistors as amplifiers (single stage and two stage) and switches (On/OFF).
6. Use of transistors as Oscillators, phase shift, Colpitt's and Harley
7. Study of OPAMP IC741 as comparators and amplifiers (both inverting and noninverting).
8. Study of OPAMP IC741 as feedback amplifier and determine the frequency response of the OPAMP and the gain bandwidth product.
9. Study of OPAMP IC741 as a mathematical tool : adder, multiplier, differentiator, integrator.
10. Verification of De Morgan's theorem and other Boolean identities.
11. Study of D, RS and JK flip flops and the use of these flip-flops in time division multiplexing operations.
12. Study of ripple and ring counters.

Textbooks:

1. A. Malvino, D.J. Bates, Electronics Principles (Special Indian Edition),7E, Tata McGraw Hills, New Delhi (2006).

2. A. Malvino and J. Brown, Digital Computer Electronics, Career Education (1992)
3. P.B. Zbar, A.P. Malvino, M.A. Miller, Basic Electronics : A Text-Lab Manual, Glencoe Division Macmillian / McGraw-Hill (1994).
4. D.C. Sarkar, Transistor Circuits.

Notes

IISER TH IRUVANANTH APURAM GUIDE BOOK 2009

Appendices

Appendix 1

Calender for Vasanth Semester 2009

Days	Aug '09	Sep '09	Oct '09	Nov '09
Sun				1
Mon				2 GuruNanak Jayanthi
Tue		1		3
Wed		2 Thiruvonam		4
Thu		3	1	5
Fri		4 Sports day	2 Gandhi Jayanthi	6
Sat	1	5	3	7
Sun	2	6	4	8
Mon	3 Orientation Sem I Classes begin for Sem III	7	5	9
Tue	4 Classes begin for Sem I	8	6	10
Wed	5	9	7	11
Thu	6	10	8	12
Fri	7	11	9	13 Final Exam HUM 211, HUM 111
Sat	8	12	10	14
Sun	9	13	11	
Mon	10	14 I[st] Mid Sem Exam CHY 211, PHY 111	12	16 Final Exam PHY/CHY 112
Tue	11	15 I[st] Mid Sem Exam PHY 211, CHY 111	13	17 Final Exam PHY 212, BIO 112
Wed	12	16 I[st] Mid Sem Exam MAT 211, BIO 111	14	18 Final Exam CHY 212, BIO 112
Thu	13	17 I[st] Mid Sem Exam BIO 211, MAT 111	15	19 Final Exam PHY/CHY 112, BIO 212
Fri	14 Janmashtami	18 I[st] Mid Sem Exam IDC 211, IDC 111	16	20 Final Exam PHY 211, IDC 111
Sat	15 Independence Day	19	17	21
Sun	16	20	18	22
Mon	17	21 Id ul Fitr	19 II[st] Mid Sem Exam CHY 211, PHY 111	23 Final Exam CHY 211, PHY 111
Tue	18	22	20 II[st] Mid Sem Exam PHY 211, CHY 111	24 Final Exam IDC 211, CHY 111
Wed	19	23	21 II[st] Mid Sem Exam MAT 211, BIO 111	25 Final Exam MAT 211,BIO 111
Thu	20	24	22 II[st] Mid Sem Exam BIO 211, MAT 111	26 Final Exam BIO 211,MAT 111
Fri	21	25	23 Ii[st] Mid Sem Exam IDC 211, IDC 111	27 Bakrid
Sat	22	26	24	28
Sun	23	27	25	29
Mon	24	28 Vijaya Dashami	26	30 Varsha semester Recession begins
Tue	25	29	27	
Wed	26	30	28	
Thu	27		29	
Fri	28		30	
Sat	29		31	
Sun	30			
Mon	31			
	Working Days 20	Working Days 18	Working Days 21	Working Days 19
	Cumulative Work Days 20	Cumulative Work Days 38	Cumulative Work Days 59	Cumulative Work Days 78

Appendix 2

Time table for Semester I Varsha semester 2009

Time / Day	8:00 am to 9:00 am	9:00 am to 10:00 am	10:00 am to 10:30 am	10:30 am to 11:30 pm	11:30 pm to 12:30 pm	12:30 pm to 01:30 pm	01:30 pm to 02:30 pm	02:30 pm to 03:30 pm	03:30 pm to 04:30 pm
MON	PHY -111	MAT -111	BREAK	CHY -111	BIO -111	BREAK	PHY/CHY LAB -112		
TUE	CHY -111	BIO -111		MAT -111	PHY -111		BIO LAB- 112		
WED	BIO -111	PHY -111		MAT -111	CHY -111		BIO LAB- 112		
THU	MAT -111	PHY -111		CHY -111	BIO -111		PHY/CHY LAB -112		
FRI	IDC -111						HUM-111	SEMINAR	

Time table for Semester III Varsha semester 2009

Time / Day	8:00 am to 9:00 am	9:00 am to 10:00 am	10:00 am to 10:30 am	10:30 am to 11:30 pm	11:30 pm to 12:30 pm	12:30 pm to 01:30 pm	01:30 pm to 02:30 pm	02:30 pm to 03:30 pm	03:30 pm to 04:30 pm
MON	CHY -211	BIO -211	BREAK	IDC -211	PHY -211	BREAK	MAT -211		
TUE	PHY -211	HUM-211		BIO -211	CHY -211		PHY LAB -112		
WED	MAT -211	MAT -211		IDC -211	IDC -211		CHY LAB -112		
THU	BIO -211	CHY -211		PHY -211	HUM-211		BIO LAB -112		
FRI	IDC -211	BIO -211		PHY -211	CHY -211		SEMINAR		

Appendix 3

COURSES AND FACULTY FOR VASANTH SEMESTER

COURSES	*FACULTY*
THEORETICAL COURSES	
BIO -111	Tapas Manna
CHY -111	Mahesh Hariharan
MAT -111	Utpal Manna
PHY -111	Subramaniyam Sankaranarayanan
IDC -111	M.S.Gopinathan
HUM-111	Shanthi Krishnan
BIO -211	Hema Somanathan
CHY -211	George Thomas
MAT -211	K.S.S. Moosath
PHY -211	Anil Shaji
IDC -211	Unnikrishnan Nayar
HUM-211	Neelima Gopinath
LABORATORY COURSES	
BIO 112, BIO 212	Tapas Manna, Hema Somanathan
CHY 112, CHY 212	O.Thomas, K.M. Sureshan
PHY 112, PHY 212	Unnikrishnan Nayar,Anil Shaji, Subramaniyam Sankaranarayanan

Appendix 4

FACULTY

Prof. E. D. Jemmis, Ph.D. (Princeton) FASc, FNA, FTWAS
Director
jemmis@iisertvm.ac.in
0471-2597421

Prof. M. S. Gopinathan, Ph.D. (IIT Kanpur) FASc, FNA
gopi@iisertvm.ac.in
0471-2597428

Dr. Ayan Datta, Ph.D. (JNCASR Bangalore)
ayan@iisertvm.ac.in
0471-2597437

Dr. Kana M.Sureshan, Ph.D.(NCL, Pune)
kms@iisertvm.ac.in
0471-2597437

Dr. Utpal Manna, Ph.D. (Wyoming)
manna.utpal@iisertvm.ac.in
0471-2597437

Dr. Tapas Manna, Ph.D. (Bose Institute, Kolkata)
tmanna@iisertvm.ac.in
0471-2597437

Dr. Anil Shaji, Ph.D. (Texas, Austin)
shaji@iisertvm.ac.in
0471-2597437

Dr. Mahesh Hariharan, Ph.D. (NIIST)

Dr. Hema Somanathan, Ph.D. (University of Bombay)

Dr. Subramaniyam Sankaranarayanan, Ph.D.(IUCAA, Pune)

Dr. Archana Pai, Ph.D.(IUCAA, Pune)

VISITING FACULTY

Prof. Unnikrishnan Nayar, Ph.D. (Kerala University)
nayarvu@iisertvm.ac.in

Dr. George Thomas, Ph.D., FASc, NIIST, Trivandrum
kgt@iisertvm.ac.in

Dr. K.S.S. Moosath,Ph.D, IIST,Trivandrum

Laboratory Coordinator

O.Thomas
othomas@iisertvm.ac.in
0471-2597437

Appendix 5

Administration

Secretary to Director
0471-2597421

Mr. S. B. Jayaram
Consultant, Administration and Purchase
sbjayaram@iisertvm.ac.in
0471-2597454

Mr. A.D. George
Consultant, Administration
georgeaynikkal@iisertvm.ac.in

Mr. K.S.G Kurup
Manager, Administration
kurup@iisertvm.ac.in

Mr. Viswanathan Nair
Consultant, Finance
dviswanathan@iisertvm.ac.in
0471-2597422

Mr. Gujjuru Muni Bhaskar
Project Engineer cum Estate Officer
gujjuru@iisertvm.ac.in
0471-2597446