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I. COURSE TITLE: Exchanging Meta-for (m) s: films and the Indian Imaginary

II. COURSE CODE: ART 101

III. COURSE CREDITS (L: T: P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L: T: P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Jaideep Chatterjee

VIII. SCHOOL/ DEPARTMENT: Art, Design and theatre

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: History, Sociology, Anthropology, Political Science, Art, Media, Design, and Architecture, anyone interested in Visual Culture, Media or Films

X. COURSE CONTENT:
Exchanging Meta-for (m) s: films and the Indian Imaginary

Ever since Benedict Anderson’s useful theorization that nations are, in essence, communities that are imag(ined) into existence, the question of what roles IMAGE(s) play in producing what we believe is a nation and our feelings of belonging to it has taken central stage. In India this question is especially apt vis-à-vis film and their concomitant artworks (songs, posters, trailers etc.) Think for a minute about the representations of an agrarian feminized India in the movie Mother India, or how movie Roja portrayed what patriotism mean, or even how, more recently, the movie Delhi 6 in which the main protagonist “returns” to “old” Delhi to find himself “anew”.

Indeed, so pervasive is the relationship between films and Indian national and self imagination, it immediately begs certain questions: 1) What kind of images of social reality have films helped the nation and its peoples adopt, 2) What and in which areas(s) has been the specific contribution of such images to the national imaginary, 3) How has the nation, its geopolitics, techno-politics and other such pactices, in turn, provided much fodder for films?

We shall unpack these and many more questions in this course through an analysis of films as well as secondary literatures that explore the relationship between visual cultures and nationalism.

XI. RECOMMENDED BOOKS:
1) Chatterjee, Partha, “Whose Imagined Community,” The Nation and its Fragments. (Handout)
2) Charabarty, Dipesh, “Nation and Imagination,” Provincializing Europe
3) Geertz, Clifford, “Thick Description: towards an Interpretative theory of Culture”, The Interpretation of Culture. (Handout)
4) Mirzoeff, Nicholas, Ch. 1 “Introduction: what is Visual Culture, “An Introduction to Visual Culture (Handout)
5) Langer, Mark, “Cinema and Nation,” Film History (PDF on Course Website [CW])
8) Nayyar, Shila, Invisible Representation: The Oral Contours of a National Popular Cinema, Film Quarterly, (PDF on CW)
9) Nandy, Ashis, the Popular Hindi Film: Ideology and First Principles,” IIC Quarterly (PDF on CW)
10) Nandy, Ashis, Science as a Reason For State, (Handout)
11) Nehru Jawaharlal, the Discovery of India, Selections (Handout)
12) Kapila, Shruti, “The Enchantment of Science in India,” (CW)
13) Khilnani, Sunil, Temples of the future, The idea of India (handout)
20) Rajan, Gita, Constructing-Contesting Masculinities: Trends in South Asian Cinema (CW)
21) Lal, Vinay, Not This, Not That: The Hijras of India and the Cultural Politics of Sexuality, Social Text, No. 61, Out Front: Lesbians, Gays, and the Struggle for Workplace Rights (winter, 1999), pp. 119-140(CW)
22) Nissim Mannathukkaren, Subalterns, Cricket and the 'Nation': The Silences of 'Lagaan' Economic and Political Weekly, Vol. 36, No. 49 (Dec. 8-14, 2001), pp. 4580-4588
29) Sankaran Krishna, the Bomb, Biography and the Indian Middle Class Economic and Political Weekly, Vol. 41, No. 23 (Jun. 10-16, 2006), pp. 2327-2331

XII. ASSESSMENT SCHEME:

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<tr>
<td>Short Paper (two)</td>
<td>30 (see syllabus for due dates)</td>
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<tr>
<td>Précis (five)</td>
<td>30</td>
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<td>Term paper</td>
<td>40</td>
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I. COURSE TITLE: INTRODUCTION TO ODISSI DANCE PADDHATI-I

II. COURSE CODE: ART102

III. COURSE CREDITS (L:T:P): 0:0:3

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 0:0:3

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE(S) (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): AADYA KAKTIKAR

VIII. SCHOOL/ DEPARTMENT: SHSS/ DEPARTMENT OF ART, DESIGN & THEATRE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:
This syllabus is meant to be an introduction to the Odissi Nritya Paddhati and gives an overview of
the practical and theoretical aspects of the dance form. With readings from traditional texts, the
course explores the physical, spiritual, historical and social aspects of the dance form.

Practical
• Pada sadhana (Steps negotiating Chauk and Tribhangi 1 to 8)
• Asamyukta and samyukta hasta mudras with emphasis on Odissi mudras from Abhinaya Chandrika
• Padabheda - Demonstration and ability to identify the basic foot positions:
  • Sama, Kumbha, Dhanu and Maha

Theory
• Brief historical overview of the dance form
  • Association with temples
  • Maharis and Gotipuas

XI. RECOMMENDED BOOK(S):
1. The Natyashastra by Kapila Vatsyayan
2. Odissi What why and How by Madhumita Raut
3. Odissi Dance By D.N Patnaik

XII. ASSESSMENT SCHEME:
TO BE DISCUSSED IN THE CLASS
I. COURSE TITLE: Fundamentals of Computers

II. COURSE CODE: BIO 101

III. COURSE CREDITS (L:T:P): 2:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 2:0:2

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Ashutosh Singh

VIII. SCHOOL/ DEPARTMENT: Natural Sciences/Life Sciences

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: BS Biotech

X. COURSE CONTENT:
   Fundamentals of Computers

XI. RECOMMENDED BOOK(S):
1. Fundamentals of Computers, -V Rajaraman, PHI.
2. Introduction to computers - Peter Norton
4. Introduction to Bioinformatics- Attwood
5. Instant Notes in Bioinformatics

XII. ASSESSMENT SCHEME:
   Lab (10%), project assignments (50%), midterm (10%), and a final exam (30%). Minimum passing percentage is 50%.
I. COURSE TITLE: Essentials of Biology

II. COURSE CODE: BIO 113

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Sri Krishna Jayadev

VIII. SCHOOL/ DEPARTMENT: Natural Sciences/Life Sciences

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: B.Tech/BS chemistry/BS physics

X. COURSE CONTENT:
Unit I: Basic Cell, Molecular Biology and Genetics
Prokaryotes and Eukaryotes, Introduction to Microbiology, Cell organelles, Biochemistry of macro molecules (Carbohydrates, Lipids, Proteins and Nucleic acids), Principles of Genetics (mendelian inheritance, concept of gene, Mutation, chromosomal aberrations), Cell cycle, Cell division.
Central Dogma of Molecular Biology (Replication, Transcription, Translation and Gene expression), Introduction to Genomics, Transcriptomics and Proteomics, Basics of cloning, Cancer, Biosensors, Bio artificial organs. Applications of engineering in biology.
Instrumental techniques: Microscopy, Centrifugation, PCR, Gel Electrophoresis.

XI. RECOMMENDED BOOK(S):


XII. ASSESSMENT SCHEME:
Mid term (30%), Continuous assessment (10%) and a final exam (60%). Minimum passing percentage is 40%.
I. COURSE TITLE: Cell biology and Genetics

II. COURSE CODE: BIO 201

III. COURSE CREDITS (L:T:P): 2:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 2:0:3

V. COURSE TYPE (MAJOR/UWE/CCC): Major/ UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr Richa Priyadarshini/Dr.Sri krishna jayadev

VIII. SCHOOL/ DEPARTMENT: Natural Sciences/Life Sciences

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: BS Biotech/Minors in Biotechnology

X. COURSE CONTENT:
Cell as a basic unit of living systems, broad classification of cell types: bacteria, eukaryotic microbes, and plant and animal cells; cell, tissue, organ and organisms, Cell organelles: Ultrastructure of cell membrane and function, Chromosomes: Structural organization of chromosomes, nucleosome organization, euchromatin and heterochromatin. Cell division and cell cycle, Cell–cell interaction, apoptosis, necrosis and autophagy, Cell differentiation.


XI. RECOMMENDED BOOK(S):


XII. ASSESSMENT SCHEME:
Lab (20%), midterm (25%), Continuous assessment (5%) and a final exam (50%). Minimum passing percentage is 40
I. COURSE TITLE: MATHEMATICS IN INDIA

II. COURSE CODE: CCC 101

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Amber Habib

VIII. SCHOOL/DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:
   Overview: Mathematics had a rich history in ancient and medieval India. Indian mathematicians made original contributions to algebra, number theory and geometry; while the Kerala School made fundamental discoveries related to differential calculus and infinite series two centuries before their full development by Newton and Leibniz. This course will provide an overview of the story of mathematics in India, and also incorporate the social context and the connections with other civilizations.
   Detailed Syllabus: Issues of dating, translation and interpretation; prehistory; the ancient civilizations of Egypt, Iraq, China and America; Indus Valley Civilization; Mathematics in the Vedas and Puranas; Pythagoras theorem; Applications to grammar, logic, and astronomy; Medieval mathematicians and schools of mathematics; Invention of Zero; Trigonometry; Rates of change; π; Connections with Greece, China and the Arabs; The Kerala school.

XI. RECOMMENDED BOOK(S):
   Mathematics in India by Kim Plofker, Princeton University Press.
   History of Mathematics by Carl B Boyer and Uta C Merzbach, Wiley.

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
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<tr>
<td>Quizzes</td>
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<tr>
<td>Term Paper</td>
<td>25%</td>
</tr>
<tr>
<td>Presentation</td>
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I. COURSE TITLE: INDIAN ART & CIVILIZATION

II. COURSE CODE: CCC102

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE(S) (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): AMIT RAY

VIII. SCHOOL/ DEPARTMENT: HUMANITIES & SOCIAL SCIENCES/ ART & DESIGN

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: HISTORY, SOCIOLOGY

X. NUMBER OF STUDENTS: 30

XI. COURSE CONTENT:
Throughout human civilization, art has played a major role in examining the facts and helped us to understand the social, political and religious development of a period. The course envisages developing a rational understanding in the history of the Indian Subcontinent based on traditional beliefs and thinking through historical and archaeological findings.

Topics:
- Introduction- what is tradition, traditional art, aesthetics, symbol, iconography, etc.
- Early Civilization of Middle east- Mesopotamian Civilization, Greek & Roman Civilization, Canons of Western Art
- Indus Valley Civilization- art, town planning, social structure, trade,
- Maurya Period, Art of Gandhar, Sunga and Andhra Period, Gupta Period, Medieval India- Elephanta , Art under Rajput Influence, Art under the Mughal Dynasty

Field Trip: Museum- Mathura, National Museum- Delhi

XII. RECOMMENDED BOOK(S):
2. Anand Coomaraswamy, History of Indian & Indonesian Art; NY: Dover Pub
3. Radhakamal Mukherjee, The Culture & Art of India
4. Radhakamal Mukherjee, The Flowering of Indian Art

XIII. ASSESSMENT SCHEME:
Class Test
Presentation
I. COURSE TITLE: HUMAN FACES IN ART, SOCIETY AND MEDIA

II. COURSE CODE: CCC 103

III. COURSE CREDITS (L:T:P): 1.5

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3-0-0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE(S) (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): SUMANTRA SENGUPTA

VIII. SCHOOL/ DEPARTMENT: HUMANITIES & SOCIAL SCIENCES/ ART & DESIGN

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: HISTORY, SOCIOLOGY, ENGINEERING AND SCIENCE

X. COURSE CONTENT:

In this course students will come to know about how several human faces being used in art and media. How human emotion and psychology reflects on human facial expression and how this reflected in art and media and photography. In this course apart from class room lecture session students will also have studio workshop on ‘HOW TO DO PORTRAIT STUDY’-an introductory studio study.

XI. RECOMMENDED BOOK(S):

To be announced in the Class

XII. ASSESSMENT SCHEME:
1. Class Test
2. Presentation
I. COURSE TITLE: THE HARAPPAN CIVILIZATION

II. COURSE CODE: CCC104

III. COURSE CREDITS (L:T:P): Lecture 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Jaya Menon

VIII. SCHOOL/ DEPARTMENT: School of Humanities and Social Sciences/ Department of History

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:

The course gives an overview of the Harappan civilization (2600 – 1900 BCE), enabling one to understand the earliest urban society within the Indian subcontinent. There will be sixteen lectures on the following themes:

How do we know? Digging the past (two lectures)
Introduction to the Harappan – discovery; nomenclature; distribution; periodization; Early Harappan (one lecture)
Urbanism and the urban form – public architecture and spaces (one lecture)
Urban form – domestic spaces (one lecture)
Urban facilities (one lecture)
Subsistence base – agriculture, animal husbandry, fishing (two lectures)
Exchange (one lecture)
Craft production (two lectures)
Religion (one lecture)
Death (one lecture)
End of the Harappan (two lectures)
Late Harappan (one lecture)

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:
Quiz : 40%
Group presentation : 40%
Attendance : 20%
I. COURSE TITLE: FINANCIAL HISTORY: INSTITUTIONS, INNOVATIONS, SUCCESSES AND FAILURES

II. COURSE CODE: CCC203

III. COURSE CREDITS (L:T:P): 1.5:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): SUNIL BOWRY

VIII. SCHOOL/ DEPARTMENT: SME/FINANCE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:
The course will look at the history of financial institutions, it will cover some aspects of financial innovations, their successes and failures.

XI. RECOMMENDED BOOK(S):
CLASS MATERIAL

XII. ASSESSMENT SCHEME:
   Group Presentation (25%)
   Term Paper (40%)
   Class Performance (15%)
   Class Assignments (20%).
I. COURSE TITLE: LITERATURE IDENTITY AND THEATRE

II. COURSE CODE: CCC 302

III. COURSE CREDITS (L: T: P): 1:5:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 0:0:3

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Pramesh Ratnakar, Ajay Manchanda, Anannya Dasgupta

VIII. SCHOOL/ DEPARTMENT: English

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All the students of the university.

X. COURSE CONTENT: The course aims to use the rich resources of theatre and literature to self-consciously forge the distinctive SNU student identity. It will focus on interpersonal relationships, self-awareness building skills, communication – verbal, non-verbal and written, creative and imaginative thinking, and empathy.

XI. RECOMMENDED BOOK(S): Course content to be delivered entirely through theatre sessions. No books

XII. ASSESSMENT SCHEME:
30% - attendance
30% - practical
20% - portfolio
20% - final examination
I. COURSE TITLE: MAPPING FOR EVERYONE

II. COURSE CODE: CCC304

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Prasad Avinash Pathak

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:
   1) History of mapping
   2) Map basics
   3) Technologies contributing towards mapping
   4) Maps for different age groups
   5) Maps and mapping for Engineers
   6) Mapping for Businesses
   7) Mapping for Social phenomenon
   8) Mapping for Environmental phenomenon and natural resources
   9) Mapping for human health

XI. RECOMMENDED BOOK(S): N/A

XII. ASSESSMENT SCHEME:

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<th>Item Description</th>
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SHIV NADAR UNIVERSITY  
UNDERGRADUATE COURSE CATALOG, MONSOON 2013

I. COURSE TITLE: DRUGS AND NATURAL REMEDIES

II. COURSE CODE: CCC401

III. COURSE CREDITS (L:T:P): 1.5 (1.5 L: 0T: 0P)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3 L:0T:0P

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE(S) (IF ANY): none

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): N Sukumar, Subhabrata Sen

VIII. SCHOOL/ DEPARTMENT: Chemistry

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:

• The Principles of Drug Action:
  1. Stoichiometry and Molecular Structure
  2. Organic Functional Groups
  3. Stereochemistry
  4. Natural products, herbal remedies and active ingredients
  5. Inter-molecular forces
  6. Amino Acids and Nucleic Acids
  7. Protein Structure and Function
  8. Metal ions in biology
  9. Laws of thermodynamics
  10. Chemical Equilibrium; Free Energy

• The Principles of Drug Design:
  11. Force Fields, Molecular Modeling and Docking
  12. Lipinski’s Rules of 5; Pharmacophores
  13. Structure-Activity Relationships
  14. QSAR and the Similarity Principle
  15. High-throughput Screening
  16. Activity Cliffs and Lead Optimization

• Drug Metabolism, Toxicity and Side Effects:
  17. ADMET
  18. Costs of Drug Discovery
  19. Public health challenges in India
  20. Drug Delivery systems
  21. Drug Promiscuity
  22. Addiction and its social effects
  23. Drug Resistance
  24. Networks in Chemistry and Biology
  25. Ayurveda; alternative systems of medicine

XI. RECOMMENDED BOOK(S):
Reading assignments will be given from multiple sources including:
• John L. Lamattina, "Drug Truths: Dispelling the Myths about Pharma R&D" (John Wiley, Hoboken, NJ, 2008)
• D.D. Joshi, "Herbal Drugs Quality and Chemistry" (Studium Press, 2011)
• Barry Werth, "The Billion Dollar Molecule: One Company's Quest for the Perfect Drug" (Simon & Schuster, 1995)

XII. ASSESSMENT SCHEME:
4 In-class Quizzes: 40%
4 Group Assignments & Presentations: 40%
1 Mid-term examination: 10%
1 Final examination: 10%
Minimum for passing: 40%
Assured A grade: 90%
I. COURSE TITLE: GENETIC ENGINEERING

II. COURSE CODE: CCC 402

III. COURSE CREDITS (L:T:P): 1.5

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): 

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S):

Course co-ordinator/ Instructors: Dr. Shailja Singh/ Dr. Ashish Gupta/ Dr. Naga Suresh Veerapu

VIII. SCHOOL/ DEPARTMENT: Natural Sciences/Life Sciences

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:

Module 1: DNA engineering
Lesson 1: Introduction and overview of the course
Lesson 2: Concept of Genetic Engineering
Lesson 3: Cell and its basic composition; DNA, RNA and Proteins
Lesson 4: Genes, Central Dogma of Molecular Biology and Genetic codons
Lesson 5: Basic of PCR and its applications
Lesson 6: Introduction to cloning

Module 2: Protein Engineering
Lesson 1: Introduction and Course overview
Lesson 2: Prokaryotic and Eukaryotic Cells
Lesson 3: Central Dogma of molecular biology DNA, RNA, Protein and Protein synthesis
Lesson 4: Protein Function and Recombinant Protein production
Lesson 5: Protein, Enzyme and Antibody engineering
Lesson 6: Fermentation technology and downstream processing

Module 3: Human Disease and Biomedical engineering diagnostics
Lesson 1: Importance of Biomedical engineers in diagnosing, treating, and preventing diseases.
Lesson 2: Comprehensive overview of human diseases. Internal origin diseases, e.g., neurological disorders. External origin diseases, e.g., infectious diseases and injury.
Lesson 3: Medical imaging: MRI and computer tomography. Biomaterials, e.g., replacement bones/joints, heart replacement valves and artificial lungs and kidneys.
Lesson 4: Cell communication: Different types of receptors and ligands, the nature of their interactions, e.g., beta-blockers.
Lesson 5: Three categories of cell communication signals: autocrine, paracrine, and endocrine, e.g. controlling blood sugar level in diabetic patients.

XI. RECOMMENDED BOOK(S):
The Biomedical Engineering Handbook, Vol 1 and Vol 2, Joseph Bronzino

XII. ASSESSMENT SCHEME:
1. Class Quiz: 10 %
2. Demonstration of Genetic Engineering Instruments and quiz: 20%
3. Final Written Exam: 65%
4. Participation, attendance and class discipline: 5 % of course grade
I. COURSE TITLE: ATMOSPHERIC AEROSOLS AND CLIMATE 

II. COURSE CODE: CCC405 

III. COURSE CREDITS (L:T:P): (3:0:0) 

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): (3:0:0) 

V. COURSE TYPE (MAJOR/UWE/CCC): CCC 

VI. PREREQUISITE/S (IF ANY): N/A 

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Dimitris Kaskaoutis 

VIII. SCHOOL/DEPARTMENT: School of Natural Sciences/Physics 

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: UG students of school of Engineering and Natural Sciences 

X. COURSE CONTENT: Introduction to Atmospheric Aerosols, Aerosol types, sources and sinks, Aerosol optical, physical and chemical properties, Aerosol interaction with solar radiation and clouds, Aerosol in India, Aerosol measurement techniques, Aerosols, particulate matter and human health, Project presentations. 

XI. RECOMMENDED BOOK(S): 

XII. ASSESSMENT SCHEME: Mid-term evaluation (test/exam), end-term evaluation (exam), project presentations.
I. COURSE TITLE: ENVIRONMENTAL IMPACT ASSESSMENT

II. COURSE CODE: CCC406

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr Jyoti Sharma

VIII. SCHOOL/ DEPARTMENT: SNS

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:

Introduction; Problems of Developmental Projects, Various categories of developmental activities requiring EIA clearance; Indian Acts/Policies Requiring EIA;

Evolution and Diffusion of EIA; EIA and Earth Summit, EIA – Definition; Aim and objective of an EIA; EIA – A tool for getting answer to a set of Questions; EIA as decision aiding tool rather than decision making tool; Roles of Stakeholders in the EIA Process;

The EIA Process In India; Methods to carry out EIAs; Environmental Appraisal Procedure; The EIA Process for Ensuring Environmental Protection: Comprehensive EIA and Rapid EIA; Elements of The EIA Process; The EIA Cycle and Procedures in India for getting Environmental Clearance; EIA Report; Components of EIA; Public Hearing;

EIA Report – Hydro Electric Dam: A Case Study; Need for the EIA and EMP Study in respect to the HE Project; Hydro-Power development in India; Scoping Matrix; Methodology for Baseline Data Generation; Prediction of Impacts and their Assessment.

Environmental Management Plans (EMP); Management Plans to mitigate the adverse impacts of various activities pertaining to the project.

Drawbacks in EIA system in India.

XI. RECOMMENDED BOOK(S):


XII. ASSESSMENT SCHEME:
1. Class Test – 20 Marks
2. Assignment – 30 Marks
3. Examination to be conducted at the end – 50 Marks (3 hours)
I. COURSE TITLE: CHEMISTRY IN OUR LIFE

II. COURSE CODE: CCC407

III. COURSE CREDITS (L:T:P): 1.5 (1.5 L:0T:0P)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3 L:0T:0P

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): none

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Bimlesh Lochab

VIII. SCHOOL/ DEPARTMENT: Chemistry

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:
   1. Chemistry in humans: Eye, Brain, Cholesterol, Cell membranes, vitamins, enzymes, fatty acids, acidity etc.
   2. Chemistry in daily life: Role of colourants, adulterants (FDA), carcinogens, toiletries, hair styling, recycling codes etc.
   3. Chemistry in special fields: Electrolysis, cement, Cathode ray tube to LCDs, implants, specialty plastics, self-cleaning glasses, diapers, sutures, eye-lens, solar cells, OLEDs etc.

XI. RECOMMENDED BOOK(S):
No specific books, learning will be based on class notes, e-literature, internet

XII. ASSESSMENT SCHEME:
Quizzes (2, 80%), Assignments or Presentations (1, 20%)
Passing scheme: 40% and above- to pass the exam; A-grade ≥ 90%
I. COURSE TITLE: SCIENTIFIC EPISTEMOLOGY & CONSCIOUSNESS

II. COURSE CODE: CCC501

III. COURSE CREDITS (L:T:P): 1.5 (1.5 L: 0T: 0P)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3 L:0T:0P

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): none

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): N Sukumar

VIII. SCHOOL/ DEPARTMENT: Chemistry

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:

How do we know what we know? What is the role of the observer in science? What is consciousness? How do we know that we are not brains in vats? Is there an objective reality? Does time really exist? How do our theories of space and time depend upon our perceptions of space and time? What is empathy? Is human consciousness fundamentally different from animal consciousness? From artificial intelligence? These and other questions are considered in this interdisciplinary course, open to all students. No science background, except curiosity and a spirit of enquiry, is needed. We will learn about measurement in quantum mechanics, functional brain imaging studies, proprioception and synesthesia, anosognosia and phantom limbs, mirror neurons, the limbic system and the “God module”. Social, political, religious and philosophical attitudes on consciousness will also be addressed, but the emphasis will be on empirical evidence supporting various theories. This will be an “inverted course” in the sense that instruction will be through a combination of reading assignments, group discussions, projects, as well as short video presentations and lectures. Students are expected to do library research, write term papers, and participate actively in class discussions.

XI. RECOMMENDED BOOK(S):

Reading assignments will be given from multiple sources, including:

- Daniel C. Dennett, “Consciousness Explained” (Backbay Books, New York, 1991)
- Antonio Damasio, “The Feeling of What Happens” (Harvest Book, San Diego, 1999)
- Oliver Sacks, “The Man Who Mistook His Wife for a Hat and Other Clinical Tales” (Summit Books, New York, 1970)
- V. S. Ramachandran and Sandra Blakeslee, “Phantoms in the Brain” (Quill,
New York, 1998)


XII. ASSESSMENT SCHEME:

- In-class Presentations: 30%
- Group Assignments: 20%
- Group Discussions: 20%
- Term Paper: 30%

Minimum for passing: 40%
Assured A grade: 90%
I. COURSE TITLE: DANCE WITH A MIND OF YOUR OWN: EXPLORING MEMORY, COGNITION AND INTELLIGENCE THROUGH DANCE

II. COURSE CODE: CCC502

III. COURSE CREDITS (L:T:P): 0:0:1.5

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 0:0:3

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Aadya Kaktikar

VIII. SCHOOL/DEPARTMENT: School of Humanities, Department of Art, Design and Theatre

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:

What happens in our brain when we dance or see somebody dance? Why do we move the way we do? What does it mean to “understand” an action or a movement as such? Why do we have the ability to imitate the actions of others and how does it help us learn? How do we apply this understanding in a social context in real time to interact successfully with each other, compete, collaborate and communicate?

Understanding the way a dancer moves may provide answers to some of these questions. A dancer’s skill requires not only expert physical ability but also a wide range of cognitive skills and intelligences. Learning to move in different ways, with different pace and qualities, to express feelings with the body, to interact with space, rhythm and sound, the course seeks to understand the process of cognition and the types of intelligences used by a dancer in order to produce dance. Through a repertoire of movement and the use of reflective analysis, the course challenges the classical view of intelligence that most of us have absorbed either from education tests or by living in a culture which endorses a particular view of intelligence.

XI. RECOMMENDED BOOK(S): ____________

XII. ASSESSMENT SCHEME:

Attendance and participation is required, and constitutes 20% of the grade. It is also critical for students to keep a reflective journal throughout the course of their study.
<table>
<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Reflective journal</td>
<td>20</td>
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<tr>
<td>Presentations (2)</td>
<td>20</td>
</tr>
<tr>
<td>Final Project</td>
<td>40</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: SATELLITE IMAGING AND ITS APPLICATIONS

II. COURSE CODE: CCC603

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Bakimchandra Oinam

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:
   Introduction to Remote Sensing
   Definition of Remote Sensing, History and scope of remote sensing, Electromagnetic Radiation (EMR) and atmospheric windows, Types of remote sensing.
   Satellite platforms, sensors and resolutions
   Platforms: Airborne and Space borne, Sensors: Passive and Active, resolutions across track and along the track scanning, Optical sensors, Thermal scanners, and Microwave radar.
   Satellite missions and image characteristics: Landsat series, SPOT series, IRS satellite series, NOAA and MODIS series, etc.
   Application Studies
   LULC mapping and Change detection Analysis
   Applications of Remote sensing in Environmental monitoring and assessment
   Applications of Remote sensing in Urban developing and monitoring

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Assignments/Discussion</th>
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</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Exam#</td>
<td>40%</td>
</tr>
</tbody>
</table>
# Note: If the number of student enrolled in the course is less than 10, the examination will be in the form of Presentation and Viva (which will account for 40% of the total marks for this course)
I. COURSE TITLE: ENVIRONMENTAL STUDIES

II. COURSE CODE: CCC704

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3 L:0T:0P

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): none

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dimitris Kaskaoiutis, Sonali Bhandari

VIII. SCHOOL/ DEPARTMENT: School of Natural Sciences

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: all

X. COURSE CONTENT:

1. Multidisciplinary nature of environmental studies:
   General description of the course; Main environmental issues; potential climate change impact; Global organizations; IPCC reports

2. Natural Resources:
   General description of the renewable and non-renewable resources; forest resources, water resources, mineral and land resources; rocks and minerals; influence of the mankind activities in the environment, deforestation, desertification, drought, land use – land cover changes; solar radiation, solar spectrum, solar energy and radiation distribution in the earth’s surface.

3. Ecosystems:
   Concept, structure and function of ecosystems; Bio-geochemical cycles; ecological succession, producers, consumers; food chains; Forest, marine, aquatic, grassland ecosystems; global deserts.

4. Biodiversity:
   Life in the earth; Biodiversity classification, hot spots; Bio-geographical classification of India, relation between climate and biodiversity; threats to biodiversity

5. Environmental Pollution:
   Earth’s atmosphere, air-gas pollutants; air-gas emissions over the globe, future scenarios; atmospheric aerosols over India, Atmospheric Brownish Clouds; soil-water-marine pollution; noise-thermal-nuclear pollution; solid waste management, pollution prevention; Natural Hazards and disasters.

6. Environmental issues:
   Earth around the sun; Climate Change; Greenhouse effect and global warming; Urban climate and environment, urban heat island; acid rain; ozone layer depletion; sea-land breeze cell, valley cell; Environmental ethics, protection acts.

7. Human population and Environment:
   Population growth in developed and developing countries; Impacts on human health; HIV/AIDS and diseases; Governmental and Inter-governmental policies; information technology and environment
XI. RECOMMENDED BOOK(S):
   Environmental Studies – Basic Concepts [V.K. Ahluwalia]
   Environmental Studies [D.L. Manjunath]

XII. ASSESSMENT SCHEME:
   Midterm evaluation  20%
   Projects/presentations  30% [Optional]
   Final Exam  50%
I. COURSE TITLE: INTRODUCTION TO CLIMATE CHANGE

II. COURSE CODE: CCC705

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Bikash Parida

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

IX. COURSE CONTENT:

• Basics of climate science, components of climate system, weather and climate, The Radiative Balance, Causes of climate change.
• How is the climate changing? What is global warming?
• What is the greenhouse effect and what are fossil fuels?
• Climate Observations, Evidences for rapid climate change.
• The Earth’s Carbon Reservoirs, Carbon Cycling, Carbon Emission Scenarios, Projected Climate Changes, Effects of Climate Change

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Assignments/Quizzes</th>
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<tbody>
<tr>
<td>Essay</td>
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<tr>
<td>Final Exam</td>
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XI. RECOMMENDED BOOK(S):

I. COURSE TITLE: BIODIVERSITY: ASSESSMENT AND CONSERVATION

II. COURSE CODE: CCC706

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): DR JYOTI SHARMA

VIII. SCHOOL/ DEPARTMENT: SNS

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:

1. Introduction – What is Biodiversity and its importance, Definition;
2. Biodiversity and its Components, Genetic, Species and Ecosystem diversity – Forest, Desert, Wetlands, Mangroves; Diversity in Domesticated Animals and Plants;
3. Assessment of Biological Diversity, Inventorying And Monitoring, Measuring Species Biodiversity, Species Richness, Alpha, Beta and Gama Biodiversity;
4. Distribution and Gradients of Biodiversity, Bio-geographical Classification of India;
5. Magnitude and Levels of Biodiversity;
6. Biodiversity at Global, National and Local Levels: India as a Mega-Diversity Nation; Endemism and Endangered species, Hot-spots of biodiversity; Endemic species of India, Keystone species;
7. Threats to biodiversity : Globalization and Biodiversity Loss, Threats to biodiversity, Habitat Loss, Poaching Of Wildlife, Man-Wildlife Conflicts; Biodiversity Loss – factors, Extinction of Species and its Impact, Endangered and Endemic animal Species Of India;
8. Conservation of biodiversity : In-situ and Ex-situ Conservation of Biodiversity;
9. Value of biodiversity : Consumptive Use, Productive Use, Social, Ethical, Aesthetic Values;
10. Biodiversity Laws, IPR, Geographic Indicators, Green Accounting, People’s Biodiversity Register (PBR)- Documenting Biodiversity in Panchayats.

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:

1. Mid-Term Test – 10 Marks
2. Assignment -20 Marks
3. Field Exercise- 20 Marks
4. Final Examination – 50 Marks
I. COURSE TITLE: ART OF NUMBERS

II. COURSE CODE: CCC 801

III. COURSE CREDITS (L:T:P): 1.5:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE(S) (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Charu Sharma

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT:

Overview: This course deals with two aspects of numbers. In the first part of the course we will take up some unexplored patterns that exist in nature, study them and understand some of their applications. The second part looks at numbers as carriers of information about our lives. Here we learn how to analyze and present data in ways that help us make sense of our lives. We'll use the spreadsheet program in Open Office to analyze the data in depth.

Detailed Syllabus:

Part A: Fun with Numbers

1. Moessner’s Magic
2. Permutation, Combinations
3. Pascal Triangle, Binomial Theorem
4. Fibonacci Sequence
5. Some applications

Part B: Handling Data

1. Interacting with real time data
2. Descriptive Statistics like mean, median, mode, range, standard deviation, percentiles, quartiles
3. Introduction to a Spreadsheet program (Open Office or Excel)
4. Charts – Bar Charts, Histograms, Line Charts, Pie Charts
5. Simulations
6. Case Studies

1 Half-semester course, offered twice per semester
XI. RECOMMENDED BOOK(S):


XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Attendance</td>
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<tr>
<td>Quizzes and Assignments</td>
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</tr>
<tr>
<td>Midterm</td>
<td>30%</td>
</tr>
<tr>
<td>Final</td>
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</table>
I. COURSE TITLE: ECONOMICS AND SOCIETY

II. COURSE CODE: CCC 802

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): CCC

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Ashokankur Datta/Nishant Chadha

VIII. SCHOOL/ DEPARTMENT: SHSS/Economics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT: This is a non-technical introduction to the discipline of economics. Students are introduced to what is economics is, how economists think and what are some issues in society that economists can shed some light on.

XI. RECOMMENDED BOOK(S): None

XII. ASSESSMENT SCHEME: Quizzes (20%), Class participation (5%) and End term (75%)
I. COURSE TITLE: Engineering Mechanics

II. COURSE CODE: CED 101

III. COURSE CREDITS (L:T:P) : 3:1:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P) : 3:1:0 (6L+6T=12)

V. COURSE TYPE (MAJOR/UWE/CCC) : Major

VI. PREREQUISITE/S (IF ANY) : None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Mahesh Mugule (3L), Dr. Dipankar Roy (3L), & Dr. Sumedha Maharana (6T)

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Engineering Branches

X. COURSE CONTENT:

Unit-I: Introduction (08 Lectures)
Introduction to engineering mechanics, assumptions, methods of analysis-scalars and vectors, Force system-coplanar and non-coplanar forces, colinear-non-colinear forces, concurrent forces, non-concurrent forces, moment of force and couple, free body diagram.

Unit-II: Forces in Engineering Systems (10 lectures)

Unit-III: Centroid, Center of gravity and Moment of Inertia (08 lectures)
Definitions: Center of gravity, centroid, center of mass, Centroid of standard sections, centroid of composite sections, centroid of wires, moments of inertia, parallel axis theorem, perpendicular axis theorem, radius of gyration, moment of inertia for standard and composite sections.

Unit-IV: Motion (08 lectures)
Introduction to dynamics-kinematics and kinetics, Rectilinear motion: Determination of position, distance travelled, uniform motion, effect of increasing/decreasing velocity/acceleration, motion under gravity, relative motion, Curvilinear motion: Resolution of velocity and acceleration, tangential and normal components, radius of curvature, radial and transverse components of acceleration, Projectile Motion: Independence of horizontal and vertical motion, properties of projectile motion, projectile on inclined surfaces.
Unit-V: Kinetics of Particles (08 lectures)


Work and Energy: work of force, energy, work of constant force in rectilinear motion, work of force exerted by spring, mechanical efficiency.

XI. RECOMMENDED BOOK(S):

Textbooks:


Reference Books:

2. Engineering Mechanics, P. N. Chandramouli, PHI Learning Pvt. Ltd

XII. ASSESSMENT SCHEME:

- Minor Exam – I: 15%
- Minor Exam – II: 15%
- Quizzes: 20%
- Major Exam: 50%

Passing Mark: 40%
I. COURSE TITLE: Engineering Graphics

II. COURSE CODE: CED102

III. COURSE CREDITS (L:T:P): 1:0:1

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 1:0:2. The course is taught to all the six Engineering disciplines of 1st Year. Contact hours for one batch = 3 Hrs. No. of batches = 4. Total Contact hours = 12 Hours/week

V. COURSE TYPE (MAJOR/UWE/CCC): Compulsory Engineering Science course for all Majors of Engineering

VI. PREREQUISITE/S (IF ANY): NA

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Nishant Mishra/ Nishant Mishra

VIII. SCHOOL/DEPARTMENT: School of Engineering/ Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Engineering Disciplines

X. COURSE CONTENT:

1. Introduction
   Graphics as a tool to communicate ideas, Lettering and dimensioning, Construction of geometrical figures like pentagon and hexagon.

2. Orthographic Projection
   Principles of orthographic projections, Principal and auxiliary planes, First and Third angle projections.
   Projection of points. Pictorial view.
   Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems.
   Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other plane, Solids lying on a face or generator on a plane.
   Sectioning of solids lying in various positions, True shape of the section.
   Development of lateral surfaces, sheet metal drawing.

3. Isometric Projection
   Principles of isometric projection, Isometric projection using box and offset methods.

4. Introduction to AutoCAD

XI. RECOMMENDED BOOK(S):
   Engineering Drawing (Plane & Solid Geometry) - By N. D. Bhatt & V. M. Panchal

XII. ASSESSMENT SCHEME:
   End Term - 40
   Mid Term - 10
   Drawing Sheets Submission & Evaluation – 50
I. COURSE TITLE: Strength of Materials

II. COURSE CODE: CED 201

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:2 (6L+6P = 12)

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): Engineering Mechanics

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Sushil Kumar Singh

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Civil & Mechanical Engineering

X. COURSE CONTENT:

UNIT-I Simple stresses and strains
Concept of stress and strain: St. Venants principle of stress and strain diagram, Hooke’s law, Young’s modulus, Poisson ratio, stress at a point, stresses and strains in bars subjected to axial loading, Modulus of elasticity, stress produced in compound bars subject to axial loading, Temperature stress and strain calculations due to applications of axial loads and variation of temperature in single and compound walls.

UNIT –II Compound stresses and strains
Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr’s circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain, Relationship between elastic constants.

UNIT-III Bending moment and shear force diagrams
Bending moment and shear force diagrams, S F and B M definitions. BM and SF diagrams for cantilevers. Simply supported and fixed beams with or without overhangs and calculation of maximum BM and SF and the point of contraflexure under: Concentrated loads, Uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments.

Theory of bending stresses
Assumptions in the simple bending theory, derivation of formula: its application to beams of rectangular, circular and channel sections, composite/fletched beams, bending and shear stresses in composite beams.

UNIT-IV Torsion
Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts torsional rigidity, combined torsion and bending of circular shafts principal stress and maximum shear stresses under combined loading of bending and torsion, analysis of close-coiled-helical springs.

Thin cylinders and spheres
Derivation of formulae and calculations of hoop stress longitudinal stress in a cylinder, and sphere subjected to internal pressures increase in Diameter and volume.

**Columns and struts:** Columns under uni-axial load, Buckling of Columns, Slenderness ratio and conditions. Derivations of Euler’s formula for elastic buckling load, equivalent length, Rankine Gordon’s empirical formula.

**UNIT-V Strain energy**
Energy of dilation and distortion, resilience stress due to suddenly applied loads, Castigliano’s theorem, Maxwell’s theorem of reciprocal deflection.

**Theories of Failure**
Maximum principal stress theory, maximum shear stress theory, maximum strain energy theory, maximum shear strain energy theory, graphical representation and derivation of equation for each and their application to problems relating to two dimensional stress systems only

**XI. RECOMMENDED BOOK(S):**

**Text Books:**
2. Strength of Materials by Ryder

**XII. ASSESSMENT SCHEME:**

<table>
<thead>
<tr>
<th>Assessment</th>
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<tbody>
<tr>
<td>Minor Exam – I</td>
<td>15%</td>
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<tr>
<td>Minor Exam – II</td>
<td>15%</td>
</tr>
<tr>
<td>Assignment/ Viva-voce</td>
<td>10%</td>
</tr>
<tr>
<td>Lab Work</td>
<td>20%</td>
</tr>
<tr>
<td>Major Exam</td>
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</tbody>
</table>
I. COURSE TITLE: Fluid Mechanics

II. COURSE CODE: CED 202

III. COURSE CREDITS (L:T:P) :3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):3:0:2 (6L+6P = 12)

V. COURSE TYPE (MAJOR/UWE/CCC):Major + UWE

VI. PREREQUISITE/S (IF ANY) : None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Gopal Das Singhal

VIII. SCHOOL/DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Civil & Mechanical Engineering

X. COURSE CONTENT:
   2) Fluid statics: Fluid pressure and its measurement, hydrostatic forces on submerged bodies, buoyancy and floatation, liquids in relative equilibrium.
   3) Fluid kinematics: Continuity equation, rotational and irrotational flow, circulation and vorticity, velocity potential and stream function, flow net.
   4) Fluid dynamics: Euler’s equation, Bernoulli’s equation and its applications, impulse momentum theory and its application.
   5) Flow through pipes: Darcy-Weisbach equation, energy losses in pipelines, equivalent pipes, and multiple pipe systems.
   6) Laminar flow: Equation of motion for laminar flow through pipes, Stokes’ law, transition from laminar to turbulent flow.
   7) Dimensional analysis and similitude: Dimensional homogeneity, Buckingham’s π theorem, important dimensional numbers and their significance, geometric, Kinematic and dynamic similarity, model studies.
   8) Boundary Layer Analysis

XI. RECOMMENDED BOOK(S):

Text Books:

Reference Books:

XII. ASSESSMENT SCHEME:

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<th>Component</th>
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<tr>
<td>Minor Exam – I</td>
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<tr>
<td>Minor Exam – II</td>
<td>10%</td>
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<td>Quizzes</td>
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<tr>
<td>Lab Work</td>
<td>20%</td>
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<tr>
<td>Major Exam</td>
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I. COURSE TITLE: Structural Analysis-II
II. COURSE CODE: CED 301
III. COURSE CREDITS (L:T:P): 3:0:0
IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0
V. COURSE TYPE (MAJOR/UWE/CCC): Major
VI. PREREQUISITE/S (IF ANY): Structural Analysis-I
VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Mahesh Mugule
VIII. SCHOOL/ DEPARTMENT: School of Engineering
IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Civil Engineering
X. COURSE CONTENT:

Unit-I: Introduction to Statically Indeterminate Structures
Review of analysis for statically determinate structures, Degree of indeterminancy and stability of structures, Overview of analysis of indeterminate structures by force methods and displacement methods, Importance of matrix analysis

Unit-II: Analysis of Statically Indeterminate Beams
Theorem of three moments, energy methods, flexibility coefficients, Two hinged arches: Reaction, horizontal thrust, effect of yielding of supports, temperature change, Column analogy method: method development, analysis of beams by column analogy method

Unit-III: Analysis of Statically Indeterminate Structures
Moment distribution method: Introduction, method development, solution of continuous beam, effect of settlement and rotation of support, frames with or without lateral sway
Kani’s method: Introduction, basic concepts, application to beams and frames with and without side sway
Slope deflection method: Introduction, development of slope deflection equations, application to continuous beams and frames with and without lateral sway

Unit-IV: Matrix Stiffness method
Introduction, stiffness and flexibility coefficient, member stiffness matrix, transformation, compatibility and equilibrium, assemblage of structural stiffness matrix, Imposing support conditions, banded property of structural stiffness matrix, computer implementation

Unit-V: Plastic Analysis
Introduction, stress-strain curve, beams in pure bending, plastic moment of resistance, shape factor, load factor, plastic hinge and mechanism, plastic analysis of simple structures, upper and lower bound theorems

XI. RECOMMENDED BOOK(S):
Textbooks:

Reference Books:
1. Structural Analysis, R. C. Hibbeler, Pearson Education India
2. Theory of Structures, R. S. Khurmi, S. Chand Publishers

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Exam – I</td>
<td>15%</td>
</tr>
<tr>
<td>Minor Exam – II</td>
<td>15%</td>
</tr>
<tr>
<td>Independent Project</td>
<td>15%</td>
</tr>
<tr>
<td>Computer Assignment</td>
<td>15%</td>
</tr>
<tr>
<td>Major Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>

Minimum of 40% marks is needed to pass the course
I. COURSE TITLE: Soil Mechanics

II. COURSE CODE: CED 302

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:2 (5)

V. COURSE TYPE (MAJOR/UWE/CCC): Major + UWE

VI. PREREQUISITE(S) (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Gyan Vikash

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Civil Engineering

X. COURSE CONTENT:

Soil mechanics: need and its importance, origin of soil and grain size, weight-volume relationships, plasticity and structure of soil, Engineering classification of soil, soil compaction, permeability, seepage, in situ stresses, stresses in a soil mass, compressibility of soil, shear strength of soil, lateral earth pressure, slope stability.

XI. RECOMMENDED BOOK(S):

1. Principles of Geotechnical Engineering by Braja M. Das.

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Component</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil Mechanics Lab</td>
<td>15</td>
</tr>
<tr>
<td>Assignment and Project</td>
<td>15</td>
</tr>
<tr>
<td>First Mid Sem</td>
<td>20</td>
</tr>
<tr>
<td>Second Mid Sem</td>
<td>20</td>
</tr>
<tr>
<td>End Sem</td>
<td>30</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: Water Resources Engineering

II. COURSE CODE: CED 303

III. COURSE CREDITS (L:T:P) : 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC):Major

VI. PREREQUISITE/S (IF ANY) : Hydraulics Engineering & Hydrology

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S) : Dr. Dipankar Roy

VIII. SCHOOL/ DEPARTMENT : School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Civil Engineering

X. COURSE CONTENT:

UNIT-I
Introduction: Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, vertical distribution of soil moisture, soil moisture constants, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

UNIT-II
Canals: Classification of canals, design of Irrigation canals by Kennedy’s and Lacey’s theories, balancing depth of cutting, canal lining.

UNIT-III
Diversion Head works: Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh’s creep theory, Khosla’s theory, determination of uplift pressure, impervious floors using Bligh’s and Khosla’s theory, exit gradient, functions of U/s and d/s sheet piles.

UNIT-IV
Canal structures I: types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

UNIT-V
Canal structures II: canal regulation works, principles of design of distributory and head regulators, canal outlets, types of canal modules, proportionality, sensitivity and flexibility.

UNIT-VI
Cross Drainage works: types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

UNIT-VII
Types of dams, merits and demerits, factors affecting selection of type of dam, factors governing selecting site for dam, types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield

UNIT-VIII
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, stability analysis, drainage galleries.

UNIT-IX
Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.

UNIT-X
Spillways: types of spillways, design principles of Ogee spillways, types of spillway gates.

XI. RECOMMENDED BOOK(S):

2. Irrigation Engineering And Hydraulic Structures by Garg, S. K., Khanna Publishers
3. Irrigation, Water Power and Water Resources Engineering Arora, K. R, Standard Publisher Distributors

Reference Books:

1. Elements of Water Resources Engineering by Duggal, K. N. and Soni, J. P., New Age International
2. Irrigation and Water Resources Engineering by Aswa, G. L., New Age International

XII. ASSESSMENT SCHEME:

Minor Exam – I : 20%
Minor Exam – II : 20%
QUizzes : 20 (4X5 MARKS)
[5 Quizzes of 5 marks each will be conducted, lowest one will be ignored]

Major Exam : 40%
I. COURSE TITLE: Transportation Engineering

II. COURSE CODE: CED 304

III. COURSE CREDITS (L:T:P) : 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P) : 3:0:2 (5)

V. COURSE TYPE (MAJOR/UWE/CCC) : Major

VI. PREREQUISITE/S (IF ANY) : None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Rahul Deshpande

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Civil Engineering

X. COURSE CONTENT:

The course presents an introduction Transportation Engineering and focuses primarily on road transportation related issues. Main topics covered are:

**Introduction**: Breadth and scope of Transportation Engineering, modes of transportation and their comparison, effect of transportation systems on economy, impact on environment; Road transport Characteristics, Classification of roads, Road development plans in India, network patterns.

**Traffic Engineering**: Traffic Studies, Origin-Destination studies, speed and delay studies, accident analysis, volume studies, passenger car equivalent, etc.; Traffic control Devices, marking, Signs , Signals, Regulations; Speed-flow-density relationship, Greenshields model, signal timing estimation, capacity and Level-of-Service Analysis.

**Roadway Geometry**: Road, road user and vehicle characteristics, factors affecting design standards, cross-section elements, Stopping and overtaking sight distances, Road alignment, site selection, plan evaluation, Horizontal alignment, vertical alignment, design of summit and valley curves.

**Materials**: Subgrade soil, classification, group index, subgrade soil stabilization; Aggregate, physical properties, mechanical properties, test on aggregates; Bituminous material, classification, tests on bitumen.

**Pavement Design**: Necessity of pavement, types of pavements & characteristics , design parameters, wheel loads and axle loads, tyre pressure, load repetitions, ESWL; rigid and flexible pavement design, stresses in rigid pavement.

**Bridges** – Introduction, components and classification, Introduction to bridge hydrology and loading.

**Lab Work** based on various testing methods for materials such as soil, aggregates, and bitumen as well as exercises based on traffic engineering concepts.

XI. RECOMMENDED BOOK(S):

Reference Books:


XII. ASSESSMENT SCHEME:

Lab Work : 20% of your grade
Theory : 80% of your grade

Theory
Assignments /Quiz : 10%
Two – Mid Term Exams : 40%
Final Exam : 30%

Lab Work
Performance/writing report/ : 10%
Participation
Viva voce : 10%
Total : 100%
I. COURSE TITLE: Design of RCC Structures

II. COURSE CODE: CED 305

III. COURSE CREDITS (L:T:P):3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC):Major

VI. PREREQUISITE/S (IF ANY): Structural Analysis

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Jagabandhu Dixit

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Civil Engineering

X. COURSE CONTENT:

Properties of concrete and reinforcing steel; Basic concepts and methods of reinforced concrete design - working stress method, ultimate load method, limit states method; Design of RCC structures - limit state of collapse and limit state of serviceability; Application of limit state method to rectangular beams for flexure, shear, bond and torsion; Design of beams - rectangular, T and L beams, doubly reinforced beams, flanged beam; Development length, detailing of reinforcement; Serviceability limit states - deflection and cracking; Design of slabs - simply supported, continuous and two way; Design of columns with concentric and eccentric loadings; Design of isolated and combined footings; Design of staircases.

XI. RECOMMENDED BOOK(S):

Texts:


References:


XII. ASSESSMENT SCHEME:

Design problems for practice will be given after completion of each portion of the course.
<table>
<thead>
<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Quiz (1 and 2)</td>
<td>20%</td>
</tr>
<tr>
<td>Mid-term (1 and 2)</td>
<td>40%</td>
</tr>
<tr>
<td>End-semester</td>
<td>40%</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: Applied Chemistry

II. COURSE CODE: CHY101

III. COURSE CREDITS (L:T:P): 5 (3L: 1T: 1P)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3L:1T:3P

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR

VI. PREREQUISITE/S (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sunanda Sukumar (course coordinator); Gouriprasanna Roy, Subhabrata Sen, Partha Pratim Munshi, Debdas Ray

VIII. SCHOOL/ DEPARTMENT: Chemistry

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering

X. COURSE CONTENT:
1: Atomic structure, Periodic table, Quantum Chemistry, Spectroscopy
2: Thermodynamics, Energy, Chemical Kinetics, Photosystems
3: Nanomaterials, Organic Chemistry, Polymers
4: Water Corrosion and Biochemistry

XI. RECOMMENDED BOOK(S):
- Concepts of Engineering Chemistry: A. Srivastava and N.N. Janhavi
- Engineering Chemistry: Jain & Jain
- Other reading materials will be assigned as and when required.

XII. ASSESSMENT SCHEME:

XIII. Grading in the lecture will be based on a mid-term and a final examination with 10% of the lecture grade based on class participation. The student needs to achieve 40% in both the theory and lab separately to pass the course. To pass the course you will have to pass the lab and lecture portion separately and achieve 40% independently in each part. These parts will be weighted as 40% for lab and 60% for lecture.
I. COURSE TITLE: Chemical Principles

II. COURSE CODE: CHY111

III. COURSE CREDITS (L:T:P): 5 (3L: 1T: 1P)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3L:1T:3P

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/UWE

VI. PREREQUISITE/S (IF ANY): none

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): N. Sukumar (course coordinator); Sonali Bhandari, Sunanda Sukumar

VIII. SCHOOL/ DEPARTMENT: Chemistry

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Natural Sciences

X. COURSE CONTENT:

1. The Principles of Periodicity and Chemical Bonding:
   - Introduction of statistical concepts in physics
   - The statistics of electrons
   - The Born-Oppenheimer approximation and molecular structure
   - Atomic and molecular orbitals; Chemical bonding
   - Chemical periodicity & electronic structure
   - Inter-molecular forces; Spectroscopy

2. The World of Carbon and Macromolecules:
   - Organic Functional Groups
   - Structure-Activity Relationships
   - Basics of organic chemistry
   - Polymers and plastics
   - Biopolymers
   - Nanomaterials and their importance

3. The Principles of Chemical Equilibrium:
   - Heat & Work; State Functions
   - Laws of thermodynamics
   - Probability and Entropy
   - Ionization Equilibria; pH; Acid-Base Titration
   - Activation Energy; Arrhenius equation
   - Thermodynamic and Kinetic Stability
   - Free Energy, Chemical Potential, Electronegativity
   - Phase Rule
   - Electrochemistry
   - Renewable sources of energy; Photosystem II.

XI. RECOMMENDED BOOK(S):
Chemical Principles - Richard E. Dickerson, Harry B. Gray, Jr. Gilbert P. Haight
Valence - Charles A. Coulson [ELBS/Oxford Univ. Press]
The Feynman Lectures on Physics, Vol.III
Physical Chemistry - P. W. Atkins [3rd Ed. ELBS]

Other reading materials will be assigned as and when required.

XII. ASSESSMENT SCHEME:

This course consists of a lecture and a lab component. These parts will be weighted 40% for lab and 60% for lecture. For the lecture portion there will a final examination (carrying 20% of the total grade), several assignments (20%) and pop quizzes taken during any class hour (20%).
I. COURSE TITLE: Chemical Analysis Lab

II. COURSE CODE: CHY213

III. COURSE CREDITS (L:T:P): 2 (1L: 0T: 1P)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 1L:0T:3P

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE/S (IF ANY): CHY101/ CHY111

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sunanda Sukumar, Bimlesh Lochab

VIII. SCHOOL/ DEPARTMENT: Chemistry

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Natural Sciences, Engineering

X. COURSE CONTENT:
   Synthesis of a coordination complex Cu[(NH₃)₄OH]Cl; uv-vis spectroscopy
   Beer’s Law – KMnO₄, uv-vis spectroscopy
   Column Chromatography with Spinach leaves
   Characterizing an aldehyde: melting point, uv-vis; Technique grade
   Preparation/Characterization of Derivative: melting point, uv-vis, IR
   Conductometric titration of a solution
   TLC of two compounds
   Purification by solvent extraction, recrystallization

XI. RECOMMENDED BOOK(S): *none*

XII. ASSESSMENT SCHEME:
The lab experiment course shall consist of 3 parts, a pre-lab, the experiment (data collection) and the post lab section. There will be a lab exam and *viva* which will constitute 35% of the lab grade. There will be 2 reviews of technique during the semester, during the 4th week and again during the 7th week which will together count for 10% of the lab grade. Lab reports shall be turned in the week after the experiment is completed for 45% of the grade. The first 15 min of most of the labs will be a quiz which must be taken before you may proceed with the designated experiment for the week. This shall constitute 10% of the course grade.
I. COURSE TITLE: Image and Sound Studio

II. COURSE CODE: COM199

III. COURSE CREDITS (L:T:P): 3 (3 Lectures a week over a semester)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 1:1:3

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE(S) (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Shahid Jamal

VIII. SCHOOL/DEPARTMENT: School of Communication

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All

X. COURSE CONTENT: The studio is designed to familiarize the basic production concepts and techniques of image and audio recording and production, mainly through hands-on training, short lectures and studio-based production exercises. The students are supposed to do intermediary level projects in order to take up final project. They will be familiarized with the various skills required in still photography, video and sound designing. At the end of the course each student has to design an A/V project with sync sound.

XI. RECOMMENDED BOOK(S): Multiple sources

XII. ASSESSMENT SCHEME: Credit will be based on: Proficiency Test (Skill) 10%, Quiz (Theory) 10%, First Production Exercise (10%), Second Production Exercise (20%) and Final Individual Project (50%).
I. **COURSE TITLE**: Problem Solving Through Programming

II. **COURSE CODE**: CSD101

III. **COURSE CREDITS** (L: T: P): 3:0:1

IV. **TOTAL CONTACT HOURS/WEEK** (L: T: P): 3:0:2

V. **COURSE TYPE** (MAJOR/UWE/CCC): MAJOR

VI. **PREREQUISITE/S** (IF ANY): NONE

VII. **COURSE COORDINATOR(S)/INSTRUCTOR(S)**: Muneendra Ojha

VIII. **SCHOOL/DEPARTMENT**: SOE/CSE

IX. **DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST**: MANDATORY FOR ALL ENGINEERING

X. **COURSE CONTENT**: 
Basics of computer system, basic hardware components, definition of compilers, assemblers, linker, loader etc. Definition of high level, middle level and low level languages. Notations of flow Charts and its implementation. Basic Algorithms: exchange of values of two variables, Summation of set of numbers, Factorial Computation, Generation of Fibonacci Sequence, Reversing of digits of an integer, Base conversions, Character to Number conversion, Finding Square Root, Factorial, GCD, Generating Prime numbers.

C Programming Basics: Data Types, Variables, Constants, Expressions, Operators, Operator precedence and associativity, Basic Input-Output statements, Control Structures, Simple Programs in C using all the operators and control structures, Functions: Concept of Functions, Parameters, Parameter passing method, local and global variables, scope and extent of variables. Arrays and Strings: Single and Multi-Dimensional arrays – Strings, String manipulations, Writing C programs using Strings.


XI. **RECOMMENDED BOOK(S)**:

References:

XII. ASSESSMENT SCHEME:

Theory: 60
- Quiz: 10 Marks
- Mid Term: 20
- End Term: 30

Practical: 40
- Assignments: 20
- Continuous Lab Viva: 10
- Final Lab Exam: 10
I. COURSE TITLE: Data Structures

II. COURSE CODE : CSD 201

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 5

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): CSD 101

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Data Structures

VIII. SCHOOL/ DEPARTMENT: Department of Computer Science & Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:
   Abstract Data Types – Arrays, String, Structure, Union and pointers; Order Analysis – Big-O, Omega and Theta notations
   Elementary Data Structures – Stack, Linked List, Queues.
   Recursion, Tail recursion and Iteration.
   Trees: Dictionaries and Hashing, Trees, BFS, DFS
   Searching Techniques – Sequential, Binary including traversal, expression notation, AVL trees, B-tree
   Sorting Techniques – Bubble, Selection, Insertion, Merge-sort, Heaps and Heap-sort, Quick, Shell, Radix
   Graphs – Representation, directed and undirected, Minimum Spanning Tree, Greedy Algorithms – Prim’s and Kruskal, Shortest Path Algorithm – Dijkstra’s algorithm

XI. RECOMMENDED BOOK(S):
   2. R. L. Kruse, B. P. Leung, C. L. Tondo, “Data Structures and program design in C”
   5. Weiss, M.A., “Data Structures and Algorithm Analysis in C”

XII. ASSESSMENT SCHEME:
   Programming assignments: There will be 4 programming assignments, and a research project, which students can do in small groups or individually. There will be a penalty for late submissions.

   Academic honesty: All programming assignments must be an individual effort of the student submitting the work for grading. Plagiarism and cheating during quizzes/assignment/exams will not be tolerated and may result in F grade in the subject.

   Project: For the research project, students will choose a graph algorithm to study in depth and develop an implementation of that algorithm in a selected application context, and write a research paper describing the results of this research. Everybody (team) will summarize the
results of the research project in a 15 minutes talk given in class. The research paper (around 8 - 10 pages long), and the programs must be submitted for grading.

**Tests:** There will be 7 tests during the semester:

Tentative dates for the tests:
August 21/22, 2013.
September 12, 2013.
September 26, 2013.
October 10, 2013.
October 31, 2013.
November 7, 2013.
November 21, 2013.

**Grades:**
- Programming assignments: 5 points each
- Project: 10 points
- Tests: 10 points each
I. COURSE TITLE: SOFTWARE ENGINEERING

II. COURSE CODE: CSD301

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/UWE

VI. PREREQUISITE/S (IF ANY): CSD101, CSD201

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Richa Sharma

VIII. SCHOOL/ DEPARTMENT: SOE/CSE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:


XI. RECOMMENDED BOOK(S):

Text Books:

References:

XII. ASSESSMENT SCHEME:

Quiz/Assignment – 20%
Mid-Term I - 15%
Mid-Term II - 15%
Major - 30%
Lab - 20%
I. COURSE TITLE: Analysis and Design of Algorithms

II. COURSE CODE: CSD 302

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:2

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR

VI. PREREQUISITE(S) (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Debopam Acharya

VIII. SCHOOL/ DEPARTMENT: SOE/CSE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: The goal of this course is to provide a foundation in the design and analysis of various computer algorithms.


XII. ASSESSMENT SCHEME:

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<tr>
<td>Midterm Test I</td>
<td>10%</td>
<td>1 hour</td>
<td>Closed Book, In Class</td>
</tr>
<tr>
<td>Midterm Test – II</td>
<td>10%</td>
<td>1 hour</td>
<td>Closed Book, In Class</td>
</tr>
<tr>
<td>Assignments</td>
<td>20%</td>
<td>By due date</td>
<td>Open Book, Submit Online</td>
</tr>
<tr>
<td>Laboratory/Class Practice</td>
<td>20%</td>
<td>By due date and time</td>
<td>Open Book, In Lab/Class, Submit Online</td>
</tr>
<tr>
<td>Attendance</td>
<td>10%</td>
<td>--</td>
<td>See Attendance and Participation</td>
</tr>
<tr>
<td>Comprehensive Exam</td>
<td>30%</td>
<td>3 hours</td>
<td>Closed Book, In Class</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: THEORY OF COMPUTATION

II. COURSE CODE: CSD303

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR

VI. PREREQUISITE(S) (IF ANY): NONE

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Shashi Prabh

VIII. SCHOOL/DEPARTMENT: SOE/CSE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:
Automata and Language Theory: Finite automata, regular expressions, push down automata, context free grammars, pumping lemma
Compatibility Theory: Turning machine, Church-Turing Thesis, decidability, halting problem, reducibility, recursion theorem
Complexity Theory: Time and space measures, hierarchy theorems, complexity classes, complete problems, P versus NP conjecture, quantiers and games.

XI. RECOMMENDED BOOK(S):


XIII. ASSESSMENT SCHEME:

Quizzes 15%,
Homeworks 35%,
One mid-semester exam 20%,
Final exam 30%.
I. COURSE TITLE: Computer Networks

II. COURSE CODE: CSD 304

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:2

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR

VI. PREREQUISITE/S (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Debopam Acharya

VIII. SCHOOL/ DEPARTMENT: SOE/CSE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ECE

X. COURSE CONTENT: This course deals with the fundamental concepts of data communications including architecture models, protocol suites, network programming, signal and data transmissions, error detection, and performance analysis.


XII. ASSESSMENT SCHEME:

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</tr>
<tr>
<td>Laboratory/Class Practice</td>
<td>20%</td>
<td>By due date and time</td>
<td>Open Book, In Lab/Class, Submit Online</td>
</tr>
<tr>
<td>Attendance</td>
<td>10%</td>
<td>--</td>
<td>See Attendance and Participation</td>
</tr>
<tr>
<td>Comprehensive Exam</td>
<td>30%</td>
<td>3 hours</td>
<td>Closed Book, In Class</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: MACHINE LEARNING: TOOLS, TECHNIQUES, APPLICATION

II. COURSE CODE: CSD320

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:1

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/UWE

VI. PREREQUISITE(S) (IF ANY): CSD101

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): PROF HARISH KARNICK

VIII. SCHOOL/ DEPARTMENT: SOE/CSE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL

X. COURSE CONTENT:

XI. RECOMMENDED BOOK(S):

XIII. ASSESSMENT SCHEME:
I. COURSE TITLE: Image Processing and Its Applications

II. COURSE CODE: CSD 321

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 5

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Santosh Singh

VIII. SCHOOL/ DEPARTMENT: CSE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Open to all

X. COURSE CONTENT:
Fundamentals of digital image processing with particular emphasis on problems in the chosen application as a project. Topics include imaging (light, the human visual system, visual phenomena and image processing system), filtering (this will include image enhancement, restoration, edge detection, image interpolation and motion estimation), basics of image registration, feature extraction techniques (PCA, ICA, corner detection, blob detection, ridge detection). The focus of the course is a series of labs that provide practical experience in processing different types of data and implementation of mentioned imaging techniques. The labs are done on MATLAB® during weekly lab sessions.

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Evaluation Instrument</th>
<th>Weightage</th>
<th>Time</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midterm Test I</td>
<td>10%</td>
<td>1 hour</td>
<td>Closed Book, In Class</td>
</tr>
<tr>
<td>Midterm Test – II</td>
<td>10%</td>
<td>1 hour</td>
<td>Closed Book, In Class</td>
</tr>
<tr>
<td>Two Assignments</td>
<td>30%</td>
<td>By due date</td>
<td>Open Book, Submit Online by email</td>
</tr>
<tr>
<td>Project</td>
<td>25%</td>
<td>By due date</td>
<td>Open Book, In Lab/Class, Submit Online by email</td>
</tr>
<tr>
<td>Comprehensive Exam</td>
<td>25%</td>
<td>3 hours</td>
<td>In Class (open/closed book)</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: Computer Graphics

II. COURSE CODE: CSD 322

III. COURSE CREDITS (L:T:P): 2 0 1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 5

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE/S (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Jeyaprakash

VIII. SCHOOL/ DEPARTMENT: School of Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL BRANCHES OF ENGINEERING

X. COURSE CONTENT:
Introduction, CG system, Recursive Fractals, Geometric Objects, Affine Transformations - Translation, Rotation, Scaling, Homogeneous Coordinates, Concatenation.

OpenGL Transformations, Projection, Parallel, Perspective, extended Homogenous, Viewing Volumes, Frame Transformations, Clipping, View-Port transformation, Stereo Viewing, Artistic Projection, Non linear projection, Introduction to OpenGL and GLUT.


Rendering faces: Gouraud and Phong shading, Ray tracing, Ray casting, Recursive ray-tracing, Ray mesh intersection, Bounding objects, Scene description, Anti-Aliasing, Distributed ray tracing.

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:
Four lab assignments 50%
Midterm Exam 1 10%
Midterm Exam 2 10%
Final Exam 30%
I. COURSE TITLE: Principles of Microeconomics

II. COURSE CODE: ECO101

III. COURSE CREDITS (L:T:P): 3:1:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:1:0

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/UWE

VI. PREREQUISITE(S) (IF ANY): None.

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Subhra K. Bhattacharya

VIII. SCHOOL/ DEPARTMENT: SHSS/ Economics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering, Business, Other Social Sciences.

X. COURSE CONTENT:

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME: Assignments and Surprise quiz (20%): Midterm (40%); Final (40%).
I. COURSE TITLE: Logic and Scientific Methods

II. COURSE CODE: ECO 191

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCE): Major/UWE

VI. PREREQUISITE(S) (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Saptarshi Mukherjee

VIII. SCHOOL/DEPARTMENT: SHSS/Economics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Economics, Mathematics, Other social sciences

X. COURSE CONTENT:
This is an introduction to mathematical logic and scientific methods that provides an analytical foundation. The course begins with an introduction to elements of logic and deductive method and will mostly emphasize on theory of sentential (or propositional) calculus, identity, relations and deductive methods. Finally, applications of logic are presented towards a construction of mathematical theory.

XI. RECOMMENDED BOOK(S):
Lecture Notes

XII. ASSESSMENT SCHEME:
Class quizzes: 2 [each 10 points]

Mid-term exam [30 points]

End-term exam [50 points]
I. COURSE TITLE: Game Theory and Economics

II. COURSE CODE: ECO201

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE INSTRUCTOR: Saptarshi P. Ghosh

VIII. SCHOOL/ DEPARTMENT: SHSS/Economics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Maths, Business, Other social sciences

X. COURSE CONTENT:
This course is an introduction to non-cooperative game theory. We will study the basic concepts of Nash Equilibrium, Correlated Equilibrium, Dominance and rationalizability, Sub Game Perfection and Bayesian Equilibrium. We will try to apply these concepts to solve problems from various sub-disciplines of Economics like Industrial organisation, Environmental Economics and Public Economics.

XI. RECOMMENDED BOOK(S):
“Games of Strategy” by Avinash Dixit, Susan Skeath, and David H Reiley Jr.

XII. ASSESSMENT SCHEME:
4 Quizzes (9% each), 2 Home Assignments (12% each), Final Examination (40%).
I. COURSE TITLE: Intermediate Microeconomics
II. COURSE CODE: ECO 301
III. COURSE CREDITS (L:T:P): 3:1:0
IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:1:0
V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE
VI. PREREQUISITE/S (IF ANY): ECO 101 (Principles of Microeconomics)
VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Saptarshi Mukherjee
VIII. SCHOOL/ DEPARTMENT: SHSS/Economics
IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:
   Mathematics; Other social sciences
X. COURSE CONTENT:
   This course gives a detailed introduction to consumer and production theory. We use the concepts developed in these theories to build the structure of welfare economics. We study the efficiency of markets in resource allocation and the role of government in case of market failures.
XI. RECOMMENDED BOOK(S): Intermediate Microeconomics (H. Varian); Microeconomic Theory (Mas-coll, Whinston and Green).
XII. ASSESSMENT SCHEME:
   Class quizzes: 2 [each 10 points]
   Assignments: 3 [30 points]
   End-term exam [50 points]
I. **COURSE TITLE:** ISSUES IN HIGHER EDUCATION  

II. **COURSE CODE:** EDU199  

III. **COURSE CREDITS (L:T:P):** 2:1:0  

IV. **TOTAL CONTACT HOURS/ WEEK (L:T:P):** 3 (2:1:0)  

V. **COURSE TYPE (MAJOR/UWE/CCC):** UWE  

VI. **PREREQUISITE/S (IF ANY):** NONE  

VII. **COURSE COORDINATOR(S)/INSTRUCTOR(S):** GITANJALI SEN  

VIII. **SCHOOL/ DEPARTMENT:** EDUCATION  

IX. **DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:** ALL  

X. **COURSE CONTENT:**  

Objective: The course should help students to understand the current issues in Higher Education all around the world with stronger focus on issues relevant to India. It should help students explore, participate, question the current practices in the higher education followed across the world. It should encourage students to engage in guided discussions towards analyzing those issues, and encouraging them towards further participation in research, policy studies in areas of economic development, economics of education, higher education, educational policies and such.  

Overview: The course will start with an overview of development of Indian higher education system and the related issues, followed by the study of issues all around the world. Are there any common concerns across the globe? What are the difference between developed and developing countries in that respect? How the higher education has evolved over the years in India, who are the stakeholders, what is the purpose of the college or university, whom are they serving, how is the academic scenario changing in a multicultural society, who should be in college, the quality versus quantity dilemma financing in higher education and such questions will be discussed in class.  

The pedagogy will be through a combination of lecture sessions on conceptual areas, and discussions of related research papers as given in the list of readings at the beginning. Throughout the semester students will be encouraged to choose areas of their interests for preparing term paper. The students will be divided in groups and one common area will be selected by all group members for the term paper. The group should discuss the theme with instructor before finalizing the area. All groups will present their term paper during in-class sessions to be scheduled during the semester.  

Key Issues to be discussed
1. Private and Social Returns to Higher Education
2. Higher Education: a Public Good or a Private Good?
3. Access, Equity, Inclusiveness
4. Financing Higher Education
5. Affirmative Action and Impact
6. Quality Versus Quantity Dilemma
7. Internationalization of Higher Education
8. Globalization and Higher Education
9. Higher Education and Research
10. Higher Education Ranking Concerns – India & worldwide
11. Connection to politics

XI. RECOMMENDED BOOK(S):

Majority of the readings will include papers published in peer-reviewed journals, books. Research papers- the list of papers/readings will be distributed in class and well in advance, before discussing a particular topic, so that students can come prepared to participate in the discussion sessions. Therefore, students are not required to buy any textbook for this class. In-class participation in the discussion of selected readings is the primary requirement for successful completion of the course.

Suggested Readings:

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Methods of assessment</th>
<th>% weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class participation + Reading assignments</td>
<td>30%</td>
</tr>
<tr>
<td>Mid-term exam</td>
<td>30%</td>
</tr>
<tr>
<td>Group Presentation + Term paper</td>
<td>40%</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: INTRODUCTION TO ELECTRICAL ENGINEERING

II. COURSE CODE: EED101

III. COURSE CREDITS (L:T:P): 3:1:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:1:2

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR

VI. PREREQUISITE/S (IF ANY): NIL

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S):
   G. NAVEEN BABU – COURSE COORDINATOR (3 L + 2 LAB)
   ATUL VIR SNGH – LAB INSTRUCTOR (2 LABS)
   SONAL SINGHAL – LAB INSTRUCTOR (1 LAB)
   MADHUR DEO UPADHYAY – TUTORIAL INSTRUCTOR

VIII. SCHOOL/ DEPARTMENT:
   SCHOOL OF ENGINEERING/ DEPARTMENT OF ELECTRICAL ENGINEERING

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:
   ALL ENGINEERING DISCIPLINES AND PHYSICS DISCIPLINES

X. COURSE CONTENT:
   DC Circuits, KCL, KVL, Mesh and Nodal analysis, Network theorems, Step response and
   Transient response. RC, RL and RLC circuits. Phasor diagram of AC circuits. Power in 1-
   phase and 3-phase circuits. Diodes, Rectifiers, Clippers and Clampers, Transistors. Operational
   Amplifiers and their applications. Magnetic circuits. Transformers. EMF, Principle of
   Electro-mechanical energy conversion, principles of rotating machines. Laboratory experiments
   based on these topics.

XI. RECOMMENDED BOOK(S):

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>

Reference Books:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
### XII. ASSESSMENT SCHEME:
#### Evaluation Policy

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
<th>Nature of Exam</th>
<th>Date and Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz 1</td>
<td>10</td>
<td>Closed Book</td>
<td>50 Min</td>
</tr>
<tr>
<td>Test 1</td>
<td>20</td>
<td>Closed Book</td>
<td>1 Hr</td>
</tr>
<tr>
<td>Quiz 2</td>
<td>10</td>
<td>Closed Book</td>
<td>50 Min</td>
</tr>
<tr>
<td>Quiz 3</td>
<td>10</td>
<td>Closed Book</td>
<td>50 Min</td>
</tr>
<tr>
<td>End Term Exam</td>
<td>30</td>
<td>Closed Book</td>
<td>2 Hr</td>
</tr>
<tr>
<td>Lab</td>
<td>20</td>
<td>Closed Book</td>
<td>2 Hr</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: Signals and Systems

II. COURSE CODE: EED 201

III. COURSE CREDITS (L:T:P): 3:1:0

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 3:2:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major for ECE, EE, CSE and UWE for others

VI. PREREQUISITE(S) (IF ANY): EED 101 OR Mathematics courses covering Laplace Transform, Differential Equations and Basic Calculus (Approval from Instructor required)

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sandeep Joshi / P.C. Jain

VIII. SCHOOL/DEPARTMENT: SoE/EE department

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: EE, ECE, CSE, Mechanical, Civil, Mathematics

X. COURSE CONTENT:

1. Understand the types of Signals and systems and their characterization.
2. Understand the interrelation and difference between analog and digital signals.
3. Various techniques to process the analog and digital signals like Fourier transforms, Z transforms and Laplace transforms
4. Understand the characterization of LTI systems and their representation using basic block diagram techniques.
5. Introduction to random variables and two port networks
6. Application of knowledge in designing of systems like communication systems.
7. Learn MATLAB programming to solve linear systems and signals problem

XI. RECOMMENDED BOOK(S):
MATLAB, 2011, Mathworks, Inc

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
<th>Nature of Exam</th>
<th>Date*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz 1</td>
<td>10</td>
<td>Open Book</td>
<td>Surprise</td>
</tr>
<tr>
<td>Quiz 2</td>
<td>10</td>
<td>Open Book</td>
<td>Surprise</td>
</tr>
<tr>
<td>Test 1</td>
<td>30</td>
<td>Closed Book</td>
<td>Third week of September</td>
</tr>
<tr>
<td>MATLAB based Online Exam</td>
<td>15</td>
<td>Open Book</td>
<td>Week starting 11th Nov to 16th Nov</td>
</tr>
<tr>
<td>Test 2</td>
<td>35</td>
<td>Closed Book</td>
<td>Last week of Nov</td>
</tr>
</tbody>
</table>

Exact dates will be announced in lecture
I. COURSE TITLE: Electromagnetic Engineering

II. COURSE CODE: EED 301

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:6

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): Basic Physics, Vector Algebra, Partial Differential Equation

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Sitangshu Bhattacharya (3L & 2P) and Dr. Madhur Upadhyay (3L+1P)

VIII. SCHOOL/DEPARTMENT: School of Engineering, Electrical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Major in ECE, EE and Physics

X. COURSE CONTENT:

<table>
<thead>
<tr>
<th>Module No.</th>
<th>Subtitle of the Module</th>
<th>Topics in the module</th>
<th>No. of Lectures for the module</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introductory material</td>
<td>Review of scalar and vector fields Electrostatic and Magneto static Fields</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Maxwell’s Equations</td>
<td>Inconsistency of Amperes law, Continuity equation, Displacement current, Maxwell’s equations, Boundary conditions</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Electromagnetic Waves</td>
<td>Wave propagation in free space, Conductors and dielectrics, Polarization, Plane wave propagation in conducting and non conducting media, Phasor notation, Phase velocity, Group velocity; Reflection at the surface of the conductive medium, Surface Impedance, Depth of penetration. Transmission line analogy</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>Poynting Vector and Power</td>
<td>Poynting theorem, Poynting Vectors and power loss in a plane conductor.</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Transmission Lines</td>
<td>Transmission line equations, characteristic impedance, open and short circuited lines, standing wave and reflection losses. Impedance matching, Smith Chart, Simple and double stub matching</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Wave guides</td>
<td>Rectangular and circular wave guides- Modes in rectangular and cylindrical coordinates, characteristics, power transmission and losses,</td>
<td>8</td>
</tr>
</tbody>
</table>
excitation of modes. Microwave coaxial connectors. Rectangular, Circular and semi-circular cavity resonators, Q factor.

| 7 | Radiation and Antennas | Scalar and vector potentials. Radiation from a current filament, half-wave dipole and small loop antennas. Antenna characteristics, radiation pattern, radiation intensity, directivity and power gain. Antenna arrays, effective area and Friis equation. | 5 |

**Total number of Lectures** 42

### XI. RECOMMENDED BOOK(S):

2. E. M. Purcell, Electricity and Magnetism, Berkeley Physics Course Vol. II.

### XII. ASSESSMENT SCHEME: Midsem: 50 Marks and Endsem: 50 Marks
I. COURSE TITLE: Control Systems

II. COURSE CODE: EED 302

III. COURSE CREDITS (L:T:P): 5 (3:1:1)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 12 hours/week

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR


VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Gyan Ranjan Biswal

VIII. SCHOOL/ DEPARTMENT: Electrical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Electrical / Electronics / Mechanical Engg.

X. COURSE CONTENT:

<table>
<thead>
<tr>
<th>Lecture No.</th>
<th>Subtitle of the Module</th>
<th>Topics in the module</th>
<th>No. of Lectures for the module</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and Mathematical Modeling</td>
<td>Classification of Control Systems: Open-loop and Closed-loop Systems; Effect of feedback; Mathematical modeling of physical/mechanical systems and its electrical equivalents; Translation systems; Rotational systems; Servomechanisms, Servomotors, Synchros; Block Diagram and Signal Flow representation and analysis</td>
<td>1</td>
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<tr>
<td>2</td>
<td>Time - Domain Analysis</td>
<td>Standard Signals; Time-response of 1st order and 2nd order systems; Dynamic / Transient response and Steady-State Response; Steady-State Errors: Error Constants, Type-0, Type-1, and Type-2 Systems; Effect of Poles and Zeros to Transfer Functions; Dominant Poles; Design and Response of Controllers: P; PI; PD and PID</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Stability Criterion and Technique</td>
<td>Absolute and Relative Stability; Routh Stability Criterion: BIBO Systems; Necessary Conditions; Relative Stability Analysis; Root Locus Technique: Concept, Construction, and Rules of Root Loci</td>
<td>1</td>
</tr>
</tbody>
</table>
Effect of Poles and Zeros to $G(s)H(s)$ function

<table>
<thead>
<tr>
<th>4 Frequency Domain Analysis</th>
<th>Correlation between Time-Domain and Frequency-Domain Analysis</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All-Pass System; Non-Minimum-Phase System and Minimum-Phase System</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Polar Plot and Bode Plot: Properties and Constructions</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Gain Margin and Phase Margin</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Nyquist Plot: Nyquist Stability Criterion; Effect of Poles and Zeros</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Constant M and N Circles; Nichols Chart</td>
<td>2</td>
</tr>
<tr>
<td>5 Compensation Networks</td>
<td>Effect and Need of Compensatory Networks</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Types: Lead Compensator; Lag Compensator and Lag-Lead Compensator</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>PID and Modified PID Controllers</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Introduction to Digital Controllers: PLC and PAC Type Controllers</td>
<td>2</td>
</tr>
<tr>
<td>6 State-Space Analysis</td>
<td>Conventional Control verses Modern Control Theory</td>
<td>1</td>
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<tr>
<td></td>
<td>Concept of State-Space Representation</td>
<td>1</td>
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<tr>
<td></td>
<td>Realizations of Transfer Functions: Diagnosis, and Solution of State-Space Equations; transition Matrix</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Stability Criteria: Observability and Controllability of Linear Systems</td>
<td>1</td>
</tr>
</tbody>
</table>

**Total number of Lectures:** 44

**XI. RECOMMENDED BOOK(S):**

**Recommended Text Books:**

**Reference Books:**

**List of Lab Experiments**

**MEASUREMENT AND CONTROL SYSTEM LAB**

1. Measurement of different Physical Parameters such as Temperature, Level, Pressure, Flow, Force, Displacement, Velocity, and Accelerations.
2. Study the Characteristics of Synchros.
4. Steady State Error Analysis of Type – 0, Type – 1, Type – 2 Control Systems.
5. Study the Control of AC Position Servo System and DC Position Servo Systems.
6. Study the Characteristics of AC and DC Types of Servo Motor, and Measuring their Speed/Torque.
7. Study the Effect of feedback on DC Type Servo Motor.
8. Study the Characteristics of Stepper Motor Control.
9. PC Based Data Acquisition and Instrumentation (DAQ) System and/or High-end DAQ System.
10. PLC based Real-time Simulation using Seimens S-7 314 / RSLogix SLC500 Automation OR Equivalent Training Station.
12. PAC (Programmable Automation Controller) based Embedded Control environment using NI platform.

XII. ASSESSMENT SCHEME:

A.

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Component</th>
<th>% out of 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Quiz(s)</td>
<td>10</td>
</tr>
<tr>
<td>2.</td>
<td>Surprise Test</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Mid-Term Test</td>
<td>20</td>
</tr>
<tr>
<td>4.</td>
<td>Lab Assessment</td>
<td>20</td>
</tr>
<tr>
<td>5.</td>
<td>End-Term Exam</td>
<td>40</td>
</tr>
</tbody>
</table>

B.

Note:  
* Weight-age of surprise tests may be increased up to 20% by adjusting Mid-Term component.
* Exams can be of subjective and/or objective type.
* Lab assessment will be done time to time during the lab hours throughout the semester based on lab experiments done, lab records evaluation, and viva-voce.

** Minimum threshold to clear the subject is 40 percent of the total 100 marks.

** No separate test / exam will be conducted except the declared date of exams.
I. COURSE TITLE: Microprocessors and Microcontrollers

II. COURSE CODE: EED303

III. COURSE CREDITS (L:T:P): 3:0:2

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:6

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE(S) (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Ashutosh Dwivedi

VIII. SCHOOL/ DEPARTMENT: SoE / EE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: EE, ECE

X. COURSE CONTENT:

Course Perquisite (unofficial): Digital Electronics (Understanding of at-least followings components)

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Topic Name</th>
<th>Detail Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number System</td>
<td>• Decimal, Binary, Octal, Hexadecimal representation (signed-unsigned),</td>
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<tr>
<td></td>
<td></td>
<td>• Inter-conversion from one number system to other number system,</td>
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<td></td>
<td></td>
<td>• complement form,</td>
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<td></td>
<td></td>
<td>• IEEE 754 floating point number,</td>
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<td></td>
<td></td>
<td>• Codes (Binary, Gray, BCD, ASCII),</td>
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<td></td>
<td></td>
<td>• Arithmetic Operations (Addition, Subtraction, Multiplication, Division).</td>
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<tr>
<td>2</td>
<td>Boolean Algebra and Logic Gates</td>
<td>• Basic/ Axiomatic definitions, Theorems/properties,</td>
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<td></td>
<td></td>
<td>• Functions, Canonical and standard forms (SOP, POS),</td>
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<td></td>
<td></td>
<td>• Two/multiple input- positive/negative logic gates.</td>
</tr>
<tr>
<td>3</td>
<td>Gate level minimization</td>
<td>• K-map and associated operations.</td>
</tr>
<tr>
<td>4</td>
<td>Combinational Logic</td>
<td>• Analysis and design,</td>
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<tr>
<td></td>
<td></td>
<td>• Adder/ subtracter (Half-Full),</td>
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<tr>
<td></td>
<td></td>
<td>• Multiplier/ comparator, Decoder/Encoders/MUX, tri-state logic</td>
</tr>
<tr>
<td>5</td>
<td>Synchronous Sequential Logic</td>
<td>• Latches/Flip Flops (SR, D, T, JK), Edge/Level Triggered,</td>
</tr>
</tbody>
</table>
### Module 1: Historical background; Organization & Architectural Features of MPU and MCU
- Generic Architectures

#### Module 2: Basics of 8085:
- Basic 8085 microprocessor architecture and its functional blocks,
- Intel 8085 microprocessor IC pin outs and signals, address, data and control buses,
- 8085 features and Instruction set overview

#### Programming with 8085:
- Basic instruction set,
- Writing assembly language programs,

#### Interfacing:
- Types of memory and memory interfacing
- Decoding techniques – absolute and partial
- Mapping techniques – I/O mapped I/O and memory mapped I/O

#### Major Quiz 1 (MQ1)

### Module 3: Timings:
- Timing states, machine cycles and instruction cycles
- Instruction Timing diagram,

#### Looping/branching, subroutines, call/return, stack operations and I/O’s:
- Looping, counting and indexing operations related programs,
- Stack and subroutine
- Stacks and subroutines operations related programs,
- Conditional call and return instructions operations related programs
- Input/output instructions and Debugging programs

#### Interrupts:
- Interrupt system of 8085
- Interrupt process and timing diagram of interrupt instruction execution,

#### Recommend Books:
Serial Communications:
- Serial I/O lines of 8085
- Implementation asynchronous serial data communication using SOD and SID

Other Related Leftover topics

<table>
<thead>
<tr>
<th>Mid-Semester (MS) Exam</th>
<th>4</th>
<th>Study and Interfacing of peripherals with 8085</th>
<th>6</th>
<th>6 (Week 11,12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>e.g. 8255, 8253, 8251, 8259, 8257, 8279</td>
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</table>

<table>
<thead>
<tr>
<th>Major Quiz 2 (MQ2)</th>
<th>5</th>
<th>Basics of 8051:</th>
<th>6</th>
<th>6 (Week 13,14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Comparison of microprocessor and microcontroller,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Architecture and pin functions of 8051 chip controller,</td>
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<tr>
<td></td>
<td></td>
<td>CPU timing and machine cycles,</td>
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<tr>
<td></td>
<td></td>
<td>Internal memory organization,</td>
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<td></td>
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<td>Program counter and stack,</td>
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<td>Input/output ports,</td>
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<tr>
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<td></td>
<td>Counters and timers,</td>
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<td></td>
<td>Serial data input and output</td>
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<td></td>
<td></td>
<td>Interrupts.</td>
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<td></td>
<td></td>
<td>Power saving modes</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Programming with 8051:</th>
<th>6</th>
<th>Instruction set, addressing modes,</th>
<th>6</th>
<th>6 (Week 15,16)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Immediate, registers, direct and indirect</td>
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<td>Data movement and exchange instructions,</td>
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<td>Push and pop op-codes,</td>
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<td></td>
<td>Arithmetic and logic instructions,</td>
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<td></td>
<td></td>
<td>Bit level operations,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Jump and call instructions,</td>
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<tr>
<td></td>
<td></td>
<td>Input/output port programming,</td>
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<td></td>
<td></td>
<td>Programming timers,</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Asynchronous serial data communications,</td>
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<td></td>
<td></td>
<td>Hardware interrupt service routines.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Major Quiz 3 (MQ3)</th>
<th>7</th>
<th>8086 series</th>
<th>4</th>
<th>4 (Week 17,18)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Introduction to 8086, 80286, 80386 microprocessors</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Instruction set and Programming</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Interfacing</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Some additional Topics related to applications</th>
<th>8</th>
<th></th>
<th>2</th>
<th>2 (Week 18)</th>
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</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>55 Hours</th>
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</thead>
</table>
XI. RECOMMENDED BOOK(S):
1. Gaonkar R., Microprocessor Architecture, Programming, and Applications with the 8085, Penram.
3. Douglas V Hall, Microprocessors and Interfacing, Tata Mc. Gram Hill
4. Krishna Kant, Microprocessor and Microcontrollers Architecture, Programming and System Design, PHI

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Electronics Quiz(s)</td>
<td>5</td>
<td>To evaluate the basic know-how of one of essential component of this course i.e., Digital Electronics (on topics covered above corresponding table), there will be one (or two) quiz(s) conducted within first two-three weeks from start of semester on surprise basis (or at-max one day notification).</td>
</tr>
</tbody>
</table>
| Short Quiz(s) (SQ’s)       | 5         | • Through multiple surprise quizzes for evaluating day-to-day progress  
                           |                        | • Conducted during class and/or lab sessions discretely in entire semester |
| Major-Quiz(s) (MQ1,2,3)    | 15        | • 5 marks each                                                         |
| Mid-Semester Exam (MS)     | 30        | • There will be only one MS exam.                                       |
| End-Semester Exam (MS)     | 25        |                                                                        |
| Lab Component              | 20        | Evaluation is done discretely during entire semester based on          |
|                           |           | • Lab performance (lab records, viva-voce, etc.)                      |
|                           |           | • Mini-project (tentative 10 marks inclusive in Lab component)         |
I. COURSE TITLE: Digital Communications

II. COURSE CODE: EED 350

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major Elective for ECE and UWE for others

VI. PREREQUISITE(S) (IF ANY): EED 201

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sandeep Joshi

VIII. SCHOOL/ DEPARTMENT: SOE/ EE Department

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ECE, EE, CSE

X. COURSE CONTENT:

- Introduction and Overview of Digital Communication Systems and Principles, Model, Analog vs. Digital Communication, Sampling, Quantization, PCM
- Concept of Probability and Random variable: characterization and Pdfs
- Geometric representation of Signal waveforms: Gram Schmidt procedure, Constellations
- Digital modulation and demodulation schemes: performance analysis and comparison
- Synchronization and Channel equalization
- Digital Transmission: ISI, Matched filter, Maximum Likelihood detector, Transmitter, Receiver designs
- Channel capacity, Coding and Decoding, Source Coding, Information Measure, Introduction to Error control: Viterbi, Linear Block codes, Convolution Codes, Hamming, and Turbo codes.
- Introduction to Multiple Access Communication, Spread spectrum communications, OFDM

XI. RECOMMENDED BOOK(S):

Text Books:

Reference Books:

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
<th>Nature of Exam</th>
<th>Date* and Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz 1</td>
<td>10</td>
<td>Open Book</td>
<td>Surprise, 50 Minutes</td>
</tr>
<tr>
<td>Quiz 2</td>
<td>10</td>
<td>Open Book</td>
<td>Surprise, 50 Minutes</td>
</tr>
<tr>
<td>Test 1</td>
<td>30</td>
<td>Closed Book</td>
<td>1 Hour 30 minutes, Third week of September</td>
</tr>
<tr>
<td>Assign/Seminar/Project</td>
<td>10</td>
<td>Open Book</td>
<td>1 hour, Week starting 11th Nov to 16th Nov</td>
</tr>
<tr>
<td>Test 2</td>
<td>40</td>
<td>Closed Book</td>
<td>2 hours, Last week of Nov</td>
</tr>
</tbody>
</table>

Exact dates will be announced in lectures
I. COURSE TITLE: Semiconductor Devices

II. COURSE CODE: EED351

III. COURSE CREDITS (L:T:P): (3:0:0)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (3:0:0)

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR /UWE

VI. PREREQUISITE(S) (IF ANY): NA

VII. COURSE COORDINATOR(S) / INSTRUCTOR(S): Atul Vir Singh

VIII. SCHOOL/ DEPARTMENT: SOE/EE

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ECE, EE, CSE

X. COURSE CONTENT: This course will cover the fundamentals of semiconductors, energy bands, excess carrier concentration, carrier transport phenomenon, energy band diagram, physics of semiconductor junctions: p-n junctions, metal-semiconductor junctions (schottky and ohmic contacts). MOS capacitors (C-V characteristic, high and low frequency effects), MOS characteristics, threshold voltage, Enhancement / depletion type MOSFETs, short channel and narrow width effect, optoelectronic devices. Semiconductor Device Fabrication Processes: Oxidation, Diffusion, Ion Implantation, Photolithography etc., MOSFET (Al-Gate and Poly-Si self-aligned) fabrication process flow.

XI. RECOMMENDED BOOK(S):
Solid State Electronic Devices by Streetman & Banerjee (Pearson)
Semiconductor Device Fundamentals by Robert F. Pierret (Pearson)
Semiconductor devices: Physics and Technology by S. M. Sze (Wiley-Interscience)

XII. ASSESSMENT SCHEME:
Mid Term –I, 20%
Mid Term – II, 20%
Assignment (Quiz) 10%
End Term -50%
I. COURSE TITLE: Transmission and Distribution

II. COURSE CODE: EED352

III. COURSE CREDITS (L:T:P): (3-0-0)

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): (3-0-0)

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE(S) (IF ANY): Introduction to Electrical Engineering (EED 101), Circuit Theory (EED201)

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Dinkar Prasad

VIII. SCHOOL/DEPARTMENT: SOE, Electrical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Electrical Engineering, Electronics Engineering.

X. COURSE CONTENT:

UNIT I - INTRODUCTION
Introduction of electrical engineering system, Structure of electric power system, Basic elements: Generator, power transformer, transmission line, bus bar, circuit breaker, isolator, Types of distribution systems, HVDC and EHV AC transmission, Single line diagram, per unit system, complex power

UNIT II - TRANSMISSION LINE PARAMETERS
Configuration and types of conductors (solid, stranded and bundled), Resistance of line, Skin and Proximity effect, Inductance and capacitance of single phase and three phase lines for single and double circuit, symmetrical and unsymmetrical spacing and transposition, self and mutual GMD, Interference of transmission line with neighboring communication circuits

UNIT III - MODELLING AND PERFORMANCE OF TRANSMISSION LINES
Classification of lines: Short line, medium line and long line and their equivalent circuits, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation; Power flow in transmission lines; Power-angle diagram; surge impedance loading, shunt and series compensation; Ferranti effect

UNIT IV - INSULATORS AND CABLES

UNIT V - CORONA, MECHANICAL DESIGN OF LINES AND GROUNDING
Phenomenon of corona, formation and losses, potential gradient, factors effecting corona, methods to reduce corona, Mechanical design of transmission line – sag and tension calculations for different weather conditions – Methods of grounding, Substation layout-Tower Spotting

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:

Assessment will be done based on the marks of two mid-semester and one end-semester exams and 4 nos. of quizzes. A small weightage is also given to attendance and teacher’s impression about the individual student. The breakup of the weightages is as follows: 1st mid sem. exam carries 20% weightage, 2nd mid-sem. exam carries 25% weightage, end-sem. exam carries 40% weightage, 4 nos. of quizzes together carry 10% weightage and attendance/teachers impression carries 5% weightage)
I. COURSE TITLE: Exploring Literature

II. COURSE CODE: ENG 101

III. COURSE CREDITS (L:T:P): 1:0:2

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR /UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Divya Saxena, Ananya Das, Gatha Sharma

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: Exploration of Literature to understand history, society, politics, life at large.

XI. RECOMMENDED BOOK(S):
Bedford Anthology of Literature

XII. ASSESSMENT SCHEME: Short Paper 30, Long Paper 30, Evaluated Quizzes 40
I. COURSE TITLE: Fundamentals of Translation

II. COURSE CODE: ENG 102

III. COURSE CREDITS (L:T:P): 3:0:0 (REAL)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):

V. COURSE TYPE (MAJOR/UWE/CCC): MC/ UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Tulika Chandra

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: The course introduces students to the field of Translation Studies, providing a strong focus on the development of this field and addresses some of the main issues that have informed the general reflection on translation over the years. It will also make the students do the coursework along with an intensive translation practicum, a project in translation. Students will cultivate the skills of translation


XII. ASSESSMENT SCHEME: Assignment 1 10, Assignment 2 10, Term Paper + Round-table Presentation 20, Translation Project 30, Final Exam (based on the hand-outs) 30
I. COURSE TITLE: History of English Literature

II. COURSE CODE: ENG 103

III. COURSE CREDITS (L:T:P): 3:0:(IC)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Gatha Sharma

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: Indian students of English Literature need to know cultural, social and political history of England to fully comprehend the finer nuances of English Literature. This course will include study of the main aspects of English social and political history, which form the background reflected in the literary works. It will trace the development of themes and genres within their historical contexts; and analyze literary works for their aesthetic features and thematic patterns.


XII. ASSESSMENT SCHEME: Class Assignment-20 marks; Speaking Assignment-10 marks; Quiz 1- 5 marks; Quiz 2- 5 marks; Final Exam 1( Objective questions)-20 marks; Final Exam 2 (Descriptive questions)- 40 marks
I. COURSE TITLE: Language literature & Communication

II. COURSE CODE: ENG 108

III. COURSE CREDITS (L:T:P): 3:0:0 (REAL)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3 REALS(1:0:2)

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/ UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Tulika Chandra, Gatha Sharma

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: This course will make the students explore Literature and learn finer nuances of language, along with widening their capacity to communicate effectively. The course will emphasize on thinking and critical analyzing skills.


XII. ASSESSMENT SCHEME: Power point Presentation 10, Critical Analysis of Short Story 10, Résumé writing 10, Recording 10, Blog 10, Mind-map 10, Abstract 20, Final Presentation 20, TOTAL (100) 100
I. COURSE TITLE: Introduction to Creative Writing

II. COURSE CODE: ENG 201

III. COURSE CREDITS (L:T:P): 3:0:0 (VELS)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/ UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Vikram Kapur

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: English 201 uses a mixture of classroom lecture, in-class writing, workshops and production of work to familiarize the students with the nuts and bolts of prose writing. Over the duration of the course, we will discuss the cornerstones of writing memorable prose, such as using autobiography to create fiction, choosing the right point of view from which to tell the story, creating a memorable character, coming up with a beguiling plot, drawing a setting, framing affecting dialogue, finding the right voice for the story, and, finally, editing and revising a rough manuscript into a polished finished piece. The emphasis will be on writing as a reader, and reading as a writer. We will look at a number of stories by accomplished writers and identify various techniques that students can utilise in their own work. By the end of the course, students should be well-versed in the nuts and bolts of prose fiction, and have learnt story-telling techniques that they can use to create fiction as well as narrative nonfiction.


XIII. ASSESSMENT SCHEME: The students will produce two stories and a critical commentary. The first story will be 1,000 words long and turned in at mid-term. This story will account for 30 percent of the grade. The second story will be 1,500 words long and turned in with a critical commentary of 500 words where the student will discuss and reflect on the process of composing the story, while referring to concepts discussed in class. The story and the commentary will account for 60 percent of the grade. The balance 10 percent of the grade will come from attendance and class participation.
I. COURSE TITLE: Age of Shakespeare

II. COURSE CODE: ENG 203

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/ UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Ananya Dasgupta

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:
ENGLISH Major and ENGLISH Minor & Other students from the University.

X. COURSE CONTENT:
The goal of this course is to gain a sense for what made the age of Shakespeare unique in the history
of England. We will cover multiple genres of literature – prose fiction, sonnet, lyric, prose tract,
drama and masque.

XI. RECOMMENDED BOOK(S):
William Tyndale “The Obedience of a Christian Man”
Thomas More “A Dialogue Concerning Heresies”
Christopher Marlowe *Doctor Faustus*
Nicollo Machiavelli Selection from *The Prince*
A Selection of Queen Elizabeth’s speeches
Thomas More *Utopia*
Selections from Baldassare Castiglione’s *The Courtier* (“Grace” and “The Ladder of Love”)
Selection of sonnets and lyrics by Sidney, Shakespeare and Amelia Lanyer
William Shakespeare’s *Twelfth Night*
Stephen Gosson *The School of Abuse*
Sidney’s *Defense of Poesy*
Ben Jonson *The Masque of Blackness*

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active participation in class discussion</td>
<td>20</td>
</tr>
<tr>
<td>4 quizzes, one at the end of each unit</td>
<td>40</td>
</tr>
<tr>
<td>1 class presentation</td>
<td>10</td>
</tr>
<tr>
<td>1 5-page paper (2 drafts)</td>
<td>10</td>
</tr>
<tr>
<td>1 Take-home final exam</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
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</tbody>
</table>
I. COURSE TITLE: History of criticisms and critical thought

II. COURSE CODE: ENG 204

III. COURSE CREDITS (L:T:P): 3:0:0 (VELS)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Divya saxena

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: Introductory Survey of critical theory relating to the field of English/ Western literature from classical to modern periods.


XII. ASSESSMENT SCHEME: Research Presentation on critical theory=30% Quiz = 40% Research paper = 30%
I. COURSE TITLE: Literature & Culture

II. COURSE CODE: ENG 209

III. COURSE CREDITS (L:T:P): 3:0:0 (IC)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P):

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/ UWE

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Pramesh Ratnakar

VIII. SCHOOL/ DEPARTMENT: SHSS/ English.

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:

X. COURSE CONTENT: The course will demonstrate how literary texts reflect, interrogate, reinforce and at times reconstruct cultural paradigms by closely analyzing selected texts from the West and the East

XI. RECOMMENDED BOOK(S): Primary Reading: Joseph Conrad: Heart of Darkness, Raja Rao: Kanthapura

XII. ASSESSMENT SCHEME: 20% Class quiz, 30% Class presentation, 30% Assignment, 20% Final Examination
I. COURSE TITLE: Independent Study 1

II. COURSE CODE: ENG 396

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): Elective & Specialization Courses Major & Minor only

VI. PREREQUISITE/S (IF ANY): None

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Divya Saksena

VIII. SCHOOL/ DEPARTMENT: SHSS/ English

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ENGLISH Major and ENGLISH Minor

X. COURSE CONTENT: Independent study is taken by individual students with the faculty supervisor. English Majors or Advanced Minors Only

XI. RECOMMENDED BOOK(S):
   A. 1. All Quiet on the Western Front –
       2. Diary of Anne Frank
       4. Under Fire - Henri Barbusse
       5. Memoirs of an Infantry Officer - Siegfried Sassoon
       6. A Farewell to Arms - Ernest Hemingway
       7. Diary of Anne Frank
   B. 1. Wilfred Owen: On the Trail of the Poets of the Great War
       2. On the Trail of the Poets of the Great War: Edmund Blunden
       3. The Great War in Irish Poetry: W. B. Yeats to Michael Longley
       4. World War One British Poets: Brooke, Owen, Sassoon, Rosenberg and Others
       5. The Penguin Book of First World War Poetry

XII. ASSESSMENT SCHEME:
   (1) One 2-page text-based essay x 10 weeks = 50%
   (2) One 4-6 page essay (with required revision) = 20%
   (3) One 7-10 page essay (with required revision) = 30%
I. COURSE TITLE: COLONIALISM AND FOUNDATIONS OF COLONIAL KNOWLEDGE IN SOUTH ASIA, 1860-1920

II. COURSE CODE: HIS396

III. COURSE CREDITS (L:T:P): 4 Credits

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 4:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE/S (IF ANY):
   i. No formal prerequisites; but proficiency in English comprehension necessary and a preexisting interest in post colonial literature are useful.

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Sanchari Dutta

VIII. SCHOOL/ DEPARTMENT:
   a. School of Humanities and Social Sciences/ Department of History

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:
   a. BA English, BA Sociology

X. COURSE CONTENT:
   a. Our seminar explores the cultural production, consumption and circulation of the western scholarship relating to the Orient, that characterise European overseas expansion in the modern era. The class introduces students to Edward Said’s *Orientalism: Western Perceptions of the Orient* (1978), a reference point in history, sociology, area and cultural studies, and foundational text for post colonial criticism. The seminar takes at its basis, Said’s *Orientalism* and his seminal assertion that European political domination of the Orient and the knowledge relating to its land, peoples, and cultures were interdependent. Said’s indictment of Orientalism has inspired a large body of historical scholarship which elaborates colonial knowledge in relation to its imperial circumstance and has simultaneously, laid the foundations of postcolonial criticism.

   b. The present seminar will examine various forms of knowledge production and their use within the colonised world, during the nineteenth and twentieth centuries. The topics covered will include: anthropology, criminology and law; mapping, cartography and census enumeration; science and medicine; philology; museums displays and exhibitions; and nationalist discourse. Within these subject groupings, the seminar will emphasise three themes: the use of technology; the construction of imperial identities and their modes of representations; and, the appropriation of and resistance to these formulations. The reading material relates to British imperial circumstances in South Asia. Students are encouraged to read outside of the suggested texts, and if appropriate, place the discussion in a wider geo-political framework.

XI. RECOMMENDED BOOK(S):
   Arnold, A. *Colonising the Body: State Medicine and Epidemic Disease in Nineteenth Century India* (Berkeley; London, 1993)
Bayly, C. A. Empire and Information: Intelligence Gathering and Social Communication in India, 1780-1870 (Cambridge, 1999)
Cannadine, D. Ornamentalism: How the British Saw Their Empire (London; NY 2001)
Chatterjee, P. Nation and its Fragments: Colonial and Postcolonial Histories (Princeton, 1993)
Cohn, B. S. Colonialism and its Forms of Knowledge: The British in India (Princeton 1996)
Dirks, N. Castes of Mind: Colonialism and the Making of Modern India (Princeton, 2001)
Gandhi, M.K. Hind Swaraj (1909)
Harrison, M. Climates and Constitutions: Health, Race, Environment and British Imperialism in India 1600-1850 (Oxford 1999)
Inden, R. Imagining India (Cambridge, 1990)
Prakash, G. Another Reason: Science and the Imagination of Modern India (Princeton, 1999)
Vaughan, M. Curing their Ills: Colonial Power and African Illness (Stanford, 1991)

Books marked (*) are mandatory.

XII. ASSESSMENT SCHEME:
   a. Seminar course, requiring regular attendance and active participation in class discussions. Required sections of the readings will be made available to students 1 week prior to the class; students should be prepared to discuss assigned readings every week. Class presentations account for 50% of the grade.
   b. Weekly class presentations: 50% Final paper (4-5,000 words): 50%
I. COURSE TITLE: Tutorial

II. COURSE CODE: MAT 000

III. COURSE CREDITS (L:T:P): 0:3:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 0:3:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sanjeev Agrawal

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mathematics

X. COURSE CONTENT:

Overview: This course is specially designed for undergraduates majoring in Mathematics and is a compulsory course during their 1\textsuperscript{st} semester at SNU. Students will be introduced in a tutorial setting to issues regarding the nature and uses of Mathematics. The intent is to ease the transition from high school to university education, as well as to initiate the student into a more holistic view of Mathematics.

Detailed Syllabus: This course will take up issues such as the concepts of axioms and proof, the role of counter-examples, problem solving techniques, geometric intuition, the process of abstraction, etc. Some time will also be set aside for discussion of topics being studied in other courses.

XI. RECOMMENDED BOOK(S):

2. *How to Solve It* by G. Polya. 2\textsuperscript{nd} edition, Prentice Hall India, 2007

XII. ASSESSMENT SCHEME:

| Quizzes | 100% |
I. **COURSE TITLE:** Precalculus

II. **COURSE CODE:** MAT 100

III. **COURSE CREDITS (L:T:P)** 3:1:0

IV. **TOTAL CONTACT HOURS/WEEK (L:T:P):** 3:1:0

V. **COURSE TYPE (MAJOR/UWE/CCC):** Major/UWE

VI. **PREREQUISITE/S (IF ANY):**

VII. **COURSE COORDINATOR(S)/INSTRUCTOR(S):** Sneh Lata

VIII. **SCHOOL/ DEPARTMENT:** SNS/Mathematics

IX. **DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST:** Mathematics, Economics, and any discipline which admits students who haven’t done Maths at +2 and need to work their way up to Calculus.

X. **COURSE CONTENT:**

**Overview:** Introduction to modern mathematical language and reasoning: Sets and Logic, Number Systems, Functions, Limits.

**Detailed Syllabus:**

- **Sets and Logic:** Roster and set-builder notation, empty set, subsets and equality, power set, the language of logic (and, or, not, quantifiers), union, intersection, complement, Euler and Venn diagrams, algebra of sets, Cartesian product

- **Relations and Functions:** Relations, functions, real functions and their graphs, transformations of functions and their graphs, algebra of functions, polynomial and rational functions, trigonometric functions, composition, one-one functions, onto functions, inverse of a function, cardinality, finite sets, countably infinite sets, partial and total orders, max, min, sup, inf

- **Number Systems:** \( \mathbb{N} \): well-ordering property and mathematical induction, algebraic properties of \( \mathbb{Z} \) and \( \mathbb{Q} \), \( \mathbb{R} \) as an ordered field, order completeness and Archimedean property of \( \mathbb{R} \)

- **Limits:** Estimating limits numerically, examples of existence and non-existence, limit laws, applications of limit laws, tangent lines and derivatives, one-sided limits and derivatives, areas

XI. **RECOMMENDED BOOK(S):**

3. *Introduction to Real Analysis*, R G Bartle and D R Sherbert, Wiley India. 3rd ed.
XII. ASSESSMENT SCHEME:

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I. COURSE TITLE: Calculus I

II. COURSE CODE: MAT 101

III. COURSE CREDITS (L:T:P): 3:1:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:1:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): Class XII Maths or MAT 100

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Amber Habib (Coordinator), Sanjeev Agrawal, Sudeepto Bhattacharya, Neha Gupta (Instructors), Mayank Roy (Teaching Assistant)

VIII. SCHOOL/ DEPARTMENT:SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering, Sciences, Economics

X. COURSE CONTENT:

Overview: This course covers one variable calculus and applications. It forms the base for subsequent courses in advanced vector calculus and real analysis as well as for applications in probability, differential equations, optimization, etc.

Detailed Syllabus:

- **Differentiation**: Functions, limits, sandwich theorem, continuity, intermediate value theorem, tangent line, rates of change, derivative as function, algebra of derivatives, implicit differentiation, related rates, linear approximation, differentiation of inverse functions, derivatives of standard functions (polynomials, rational functions, trigonometric and inverse trigonometric functions, hyperbolic and inverse hyperbolic functions).
- **Applications of Differentiation**: Indeterminate forms and L'Hopital's rule, absolute and local extrema, first derivative test, Rolle's theorem, mean value theorem, concavity, 2nd derivative test, curve sketching.
- **Integration**: Area under a curve, Riemann sums, integrability, fundamental theorem, mean value theorem for integrals, substitution, integration by parts, trigonometric integrals, partial fractions, improper integrals.
- **Applications of Integration**: Area between curves, volume, arc length, applications to physics (work, center of mass).
- **Ordinary Differential Equations**: 1st order and separable, logistic growth, 1st order and linear, 2nd order linear with constant coefficients, method of undetermined coefficients, method of variation of parameters.

XI. RECOMMENDED BOOK(S):

Main References:
Supplementary References:


**XII. ASSESSMENT SCHEME:**

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I. COURSE TITLE: Calculus II

II. COURSE CODE: MAT 102

III. COURSE CREDITS (L:T:P): 3:1:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:1:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): MAT 101

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): A Satyanarayana Reddy

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering, Sciences

X. COURSE CONTENT:
Overview: The first part deals with series of numbers and functions. The second part is an introduction to multivariable calculus, finishing with the various versions of Stokes' theorem. The concepts and techniques covered here are used extensively in the social and natural sciences as well as in engineering to study systems with many dimensions.

Detailed Syllabus:

1. **Sequences and Series:** Limits of sequences, algebra of limits, series, divergence test, comparison and limit comparison tests, integral test, alternating series test, absolute convergence, root & ratio tests, power series, Taylor series

2. **Vectors:** Dot and cross product, equations of lines and planes, quadric surfaces, space curves, arc length and curvature

3. **Differential calculus in several variables:** Functions of several variables, level curves and surfaces, limits and continuity, partial derivatives, tangent planes, chain rule, directional derivatives, gradient, Lagrange multipliers, extreme values and saddle points, 2nd derivative test

4. **Double and triple integrals:** Double integrals over rectangles, double integrals over general regions, double integrals in polar coordinates, center of mass, triple integrals, triple integrals in cylindrical coordinates, triple integrals in spherical coordinates, change of variables

5. **Vector Integration:** Vector fields, line integrals, fundamental theorem, independence of path, Green's theorem, divergence, curl, parametric surfaces, area of a parametric surface, surface integrals, Stokes' theorem, Gauss' divergence theorem

XI. RECOMMENDED BOOK(S):
Main Reference:

Supplementary References:

XII. ASSESSMENT SCHEME:

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I. COURSE TITLE: Computing

II. COURSE CODE: MAT 110

III. COURSE CREDITS (L:T:P): 1:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 1:0:2

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE(S) (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Charu Sharma, Ziaur Rehman

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering, Sciences, Social Sciences

X. COURSE CONTENT:

Overview: This course provides an introduction to the programs Matlab and Microsoft Excel as tools for mathematical computing. The focus is on their use in applications from the fields of Statistics, Finance, Image Processing etc. Student presentations of assignment solutions will be a major component of the course.

Detailed Syllabus:

1. MATLAB:
   - Arithmetic expressions, assignment, input and output, Boolean expressions, conditional statements
   - For loop, while loop, nested loops, nested conditionals, vectors, elementary graphics, color schemes in Matlab
   - Elementary math functions, Functions with multiple input parameters, plotting
   - Two dimensional arrays, sorting, searching, cell arrays, cell arrays of matrices
   - Working with image files

2. EXCEL:
   - Charts
   - Lookup, Match, Index, Offset functions
   - Embedding form controls in a spreadsheet
   - Array functions, Goal Seek, Solver
   - Descriptive statistics with Analysis Toolpak

XI. RECOMMENDED BOOK(S):

Main References:


**Other References:**


**XII. ASSESSMENT SCHEME:**

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I. COURSE TITLE: Project I

II. COURSE CODE: MAT 199

III. COURSE CREDITS (L:T:P): 0:3:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 0:2:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): 

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Debashish Bose, Sudeepto Bhattacharya

VIII. SCHOOL/DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All (Compulsory course for Mathematics Minor)

X. COURSE CONTENT:

This is a compulsory course for students majoring or minoring in Mathematics. For students majoring in Mathematics, this course must be taken during their first year. Students attending this course will carry out a hands-on project over the full academic year. They shall work in groups on a topic chosen from applications of mathematics and computing, in areas such as finance, image recognition, encryption, coding theory, etc. The grades will be awarded at the end of the academic year.

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:

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2 This course is conducted over two semesters, with the grade being awarded at the end of the 2nd semester.
I. COURSE TITLE: Mathematical Methods

II. COURSE CODE: MAT 202

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE(S) (IF ANY): MAT 101

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Ajit Kumar (Coordinator), Krishnan Rajkumar (Instructor)

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering, Sciences

X. COURSE CONTENT:

Overview: The course covers concepts and techniques which are used extensively in the social and natural sciences as well as in engineering to study systems with many dimensions. Following a brief overview of the concept of eigenvalues and eigenvectors, the focus turns to various methods of solving ordinary differential equations (ODEs). The concepts of Fourier analysis are then covered with a view to applications to certain partial differential equations. The last part is an introduction to probability and statistics.

Detailed Syllabus:

1. Eigenvalues - Eigenvalues, eigenvectors, symmetric, skew-symmetric and orthogonal matrices, eigenbases, diagonalisation, complex matrices
2. Systems of ODEs - Linear systems of ODEs, basis of solutions, Wronskian, constant coefficient systems, phase plane, critical points, non-linear systems and linearization, non-homogeneous linear systems
4. Fourier Analysis - Fourier series and Euler formulas, arbitrary periods and half-range extensions, square error, Fourier integral and its complex form, Fourier transform, Fourier Transform of derivative, convolution, wave equation, heat equation
5. Probability - Data (relative frequency, mean, variance), axiomatic approach, random variables, mean and variance, discrete distributions (binomial, Poisson, hypergeometric), normal distribution, joint distributions, random samples & point estimation, confidence intervals

XI. RECOMMENDED BOOK(S):

Main Reference:

**Supplementary References:**


**XII. ASSESSMENT SCHEME:**

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I. COURSE TITLE: Programming

II. COURSE CODE: MAT 210

III. COURSE CREDITS (L:T:P): 1:0:1

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 1:0:2

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE(S) (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Niteesh Sahni

VIII. SCHOOL/DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering, Sciences, Economics

X. COURSE CONTENT:

Overview: This course provides an introduction to formal programming languages via the medium of Python 3.0. The programming activities will be centered around mathematical models involving differential equations, algebraic systems, iterative processes, linear transformations, random processes etc. The course begins with Python language constructs and moves to an in-depth exploration of the SCIPY and NUMPY packages that hold the key to the desired mathematical simulations.

Detailed Syllabus:

1. Basics of the PYTHON programming language:
   - Input and output statements, formatting output, copy and assignment, arithmetic operations, string operations, lists and tuples, control statements
   - User defined functions, call by reference, variable number of arguments
   - One dimensional arrays, two dimensional arrays, random number generation
   - Classes, static data, private data, inheritance, scope of variables, nested functions

2. The NUMPY and SCIPY packages:
   - NumPy numerical types, data type objects, character codes, dtype constructors.
   - Mathematical libraries, plotting 2D and 3D functions, ODE integrators, charts and histograms, image processing functions.
   - File I/O, loading data from CSV files
   - Using SCIPY/NUMPY to solve models involving difference equations, differential equations, finding limit at a point, approximation using Taylor series, interpolation, definite integrals.

XI. RECOMMENDED BOOK(S):

Main References:

1. John Zelle, Python Programming: An Introduction to Computer Science. Franklin, Beedle &

Other References:


XII. ASSESSMENT SCHEME:

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I. COURSE TITLE: Algebra I

II. COURSE CODE: MAT240

III. COURSE CREDITS (L:T:P): 3:1:0

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 3:1:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): Class XII Mathematics or MAT 100

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Krishnan Rajkumar

VIII. SCHOOL/DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mathematics, Physics, Chemistry

X. COURSE CONTENT:

Overview: Learning traditional Abstract Algebra in a contemporary style. The course covers the standard algebraic structures of groups and rings, and highlights the connection between groups and geometry through the idea of symmetry.

Detailed Syllabus:

2. Subgroups: Subgroup Tests, Subgroups Generated by Sets, Cyclic Groups, Classification of Subgroups of Cyclic Groups, Cosets and Lagrange’s Theorem.
4. Permutation Groups: Definition, Examples and Properties, Symmetric Group of n Letters ($S_n$), Alternating Group on n Letters ($A_n$), Cayley’s Theorem.
5. Direct Products, Finite Abelian Groups.
7. Integral Domains, Quotient Fields, Euclidean Rings and Polynomial Rings.

XI. RECOMMENDED BOOK(S):

- J.A. Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa
- M. Artin, Algebra, 2nd Ed., Prentice Hall India

XII. ASSESSMENT SCHEME:

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I. COURSE TITLE: Numerical Analysis I

II. COURSE CODE: MAT 280

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:2

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY):

MAT 101 Calculus I, MAT 260 Linear Algebra or equivalent. MAT 102 Calculus II or MAT 202 Mathematical Methods can be considered in lieu of MAT 260.

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Niteesh Sahni

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Engineering, Sciences, Economics

X. COURSE CONTENT:

Overview: Numerical Analysis takes up the problems of practical computation that arise in various areas of mathematics. The focus is on algorithms for obtaining approximate solutions, and their implementation by computer programs.

Detailed Syllabus:


2. Interpolation: Lagrange and Hermite interpolation, Interpolating polynomials using difference operators.


5. Systems of Linear Equations: Direct methods (Gauss elimination, Gauss-Jordan method, LU decomposition, Cholesky decomposition), Iterative methods (Jacobi, Seidel, and Relaxation methods)

6. Labs: Computational work using either Python or Matlab.
XI. RECOMMENDED BOOK(S):

Main References:

Other References:

XII. ASSESSMENT SCHEME:

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<tr>
<td>Midterm (Theory)</td>
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<tr>
<td>Midterm (Lab)</td>
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<tr>
<td>Final (Theory)</td>
<td>30%</td>
</tr>
<tr>
<td>Final (Lab)</td>
<td>10%</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: Project II

II. COURSE CODE: MAT 299

III. COURSE CREDITS (L:T:P): 0:3:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 0:2:0³

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sudeepto Bhattacharya

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mathematics

X. COURSE CONTENT:

This is a compulsory 2nd year course for students majoring in Mathematics. Students attending this course will carry out a hands-on project over the full academic year. They shall work in groups on a topic chosen from applications of mathematics and computing, in areas such as finance, image recognition, encryption, coding theory, etc. The grades will be awarded at the end of the academic year.

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:

<table>
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<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
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<tr>
<td>Report</td>
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<tr>
<td>Seminar</td>
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<tr>
<td>Assignment</td>
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³ This course is conducted over two semesters, with the grade being awarded at the end of the 2nd semester.
I. COURSE TITLE: Real Analysis II

II. COURSE CODE: MAT 320

III. COURSE CREDITS (L:T:P): 3:1:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:1:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): MAT 220

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sneh Lata

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mathematics, Physics, Economics

X. COURSE CONTENT:

Overview: Continuing the work done in MAT 220 of understanding the rigor behind one-variable Calculus, this course dwells on various aspects of functions on more general spaces, namely, metric spaces. A brief introduction to the generalities of metric spaces leads to discussions on functions on metric spaces; sequences and series of functions on metric spaces; uniform convergence and consequences; some important approximation theorems for continuous functions; rigorous discussions of some special functions; and then finally to the world of functions of several variables.

Detailed Syllabus:

1. Basics of Metric Spaces: Definitions and examples, open and closed sets, relative topology, completeness, compactness, connectedness.

2. Functions on Metric Spaces: Continuous functions, product spaces, continuity and compactness, continuity and connectedness.


4. Some Special Functions: Power Series, Abel's Theorem, the exponential, logarithmic and trigonometric functions.

5. Functions of Several Variables: Linear Transformations, derivatives, partial and directional derivatives, Chain Rule, Inverse and Implicit Function Theorems, Rank Theorem, higher derivatives.

XI. RECOMMENDED BOOK(S):

III. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
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<td>Quizzes</td>
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<td>Class performance</td>
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<tr>
<td>Midterm Exam</td>
<td>30%</td>
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<tr>
<td>Final Exam</td>
<td>30%</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: Algebra II

II. COURSE CODE: MAT 340

III. COURSE CREDITS (L:T:P): 3:1:0

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 3:1:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE(S) (IF ANY): MAT 240, MAT 260

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): A Satyanarayana reddy

VIII. SCHOOL/DEPARTMENT:SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mathematics

X. COURSE CONTENT:

Overview: The course continues the work done in MAT 240 and MAT 260 by studying the algebraic structures of rings and fields on the one hand and abstract linear algebra and module theory on the other. After laying the groundwork in these topics, diverse applications - such as finite fields, the structure of abelian groups and the Jordan canonical form of a matrix - are studied.

Detailed Syllabus:

1. Review - definition and examples of rings, ideals, quotient rings, maximal ideals, prime ideals, ring homomorphisms
2. Types of rings - integral domains, Euclidean domains, PIDs, UFDs, polynomial rings, factorization of polynomials, irreducibility criteria
3. Vector spaces - abstract vector spaces, examples, dimension, subspaces, linear transformations, matrix representations, change of basis, rank of linear transformations
4. Modules - definition and examples of modules, submodules, finitely generated modules, free modules, quotient modules and module homomorphisms
5. Fields - definition and examples of fields, characteristic, field extensions, finite extensions, zeroes of an irreducible polynomial, algebraic extensions, splitting fields, algebraic closures, finite fields - Definition, constructions and properties
6. Modules over PID - rank of matrices over PID, Smith normal form of a matrix, structure theorem for modules over PID, application to finitely generated abelian groups, applications to linear algebra - rational, Jordan canonical forms of a matrix

XI. RECOMMENDED BOOK(S):

Main References:


**Supplementary References:**


**XII. ASSESSMENT SCHEME:**

<p>| | |</p>
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<tr>
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<td>Midterm 3</td>
<td>20%</td>
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<tr>
<td>Final</td>
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</tbody>
</table>
I. COURSE TITLE: Introduction to Mathematical Finance

II. COURSE CODE: MAT 390

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:2

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): MAT 101, MAT 284

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sunil Bowry, Charu Sharma

VIII. SCHOOL/ DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mathematics, Economics

X. COURSE CONTENT:

Overview: Mathematical Finance is a modern study area where mathematical methods are used to create and add immense value in a practical environment. The aim of this course is twofold. First, to discuss the mathematical models that have driven the explosion of financial services and products over the last 30 years or so. Second, to use spreadsheet programs to work with actual data. This course is also the gateway to our Specialization in Mathematical Finance.

Detailed Syllabus:

1. Basic concepts: Bonds and shares, risk versus profit, return and interest, time value of money, arbitrage.

2. Fixed Income Securities: Net Present Value and Internal Rate of Return, price and yield of a bond, term structures, duration, immunization.


4. Forwards, Futures and Swaps: Replicating portfolios, futures on assets without income, futures on assets with fixed income or dividend yield, hedging with futures, currency futures, stock index futures, forward rate agreements, interest rate swaps, currency swaps, equity swaps.

5. Stock Price Models: Geometric Brownian Motion, Binomial Tree.


7. Labs: Microsoft Excel and VBA.

XI. RECOMMENDED BOOK(S):


XII. **ASSESSMENT SCHEME:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Assignments</td>
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<td>Midterm</td>
<td>30%</td>
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<tr>
<td>Final</td>
<td>30%</td>
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</table>
I. COURSE TITLE: Project III

II. COURSE CODE: MAT 399

III. COURSE CREDITS (L:T:P): 0:3:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 0:2:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE(S) (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Sudeepto Bhattacharya

VIII. SCHOOL/DEPARTMENT: SNS/Mathematics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mathematics

X. COURSE CONTENT:

This is a compulsory 3rd year course for students majoring in Mathematics. Students attending this course will carry out a hands-on project over the full academic year. They shall work in groups on a topic chosen from applications of mathematics and computing, in areas such as finance, image recognition, encryption, coding theory, etc. The grades will be awarded at the end of the academic year.

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:

<table>
<thead>
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<th>Assessment</th>
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<td>Assignment</td>
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4 This course is conducted over two semesters, with the grade being awarded at the end of the 2nd semester.
I. COURSE TITLE: Manufacturing Processes

II. COURSE CODE: MED101

III. COURSE CREDITS (L:T:P): 1:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 1:0:2. The course is taught to all the six Engineering disciplines of 1st Year. Contact hours for one batch = 3 Hrs. No. of batches = 4. Total Contact hours = 12 Hours/week

V. COURSE TYPE (MAJOR/UWE/CCC): Compulsory Engineering Science course for all Majors of Engineering

VI. PREREQUISITE(S) (IF ANY): NA

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Course Coordinator: Nitin Banker/
Course Instructors:
Theory (Lecture): Harender (For all the batches)
Practical: Santanu Mitra, Nitin Banker, Ramesh Gupta, Siva Sankar Murugan (Each handling practical sessions of one batch)

VIII. SCHOOL/ DEPARTMENT: School of Engineering/ Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Engineering Disciplines

X. COURSE CONTENT:
Carpentry Shop – Basic concepts, Carpentry tools, Carpentry Processes; Fitting Bench Working Shop – Introduction, Fitting tools, Fitting Processes; Welding Shop - Introduction to welding, Types of welding, Metallurgy of Weld; Machine Shop - Introduction to machine tools and machining processes, Types of cutting tools; Sheet Metal Shop- Introduction to sheet metal shop, Metals used in sheet metal works, Hand tools and accessories; Foundry Shop – Introduction, Pattern Materials, Moulding Processes; Metal Forming- Basic metal forming operations & uses; Misc. Processes- Powder-metallurgy process & its applications, Plastic-products manufacturing, Galvanizing and Electroplating

XI. RECOMMENDED BOOK(S):
Manufacturing Processes for Engineering by Kalpakjian S and Steven S, Elements of Manufacturing Processes by B.S. Nagendra and R.K. Mittal,

XII. ASSESSMENT SCHEME:
End Term - 20
Mid Term 1 - 10
Mid Term 2 - 10
Job Submission & Evaluation - 30
Records - 10
Practical Viva/Exam – 20
I. COURSE TITLE: Materials Science and Engineering

II. COURSE CODE: MED201

III. COURSE CREDITS (L:T:P): 3:0:0

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:0. Course is taught to all the five disciplines of Engineering, divided in two sections. Total contact hours = 6 Hrs/week

V. COURSE TYPE (MAJOR/UWE/CCC): Compulsory Engineering Science course for all Majors of Engineering

VI. PREREQUISITE/S (IF ANY): NA

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dipak Maity/ Dipak Maity

VIII. SCHOOL/DEPARTMENT: School of Engineering/ Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Engineering and Science Disciplines

X. COURSE CONTENT: Introduction to Materials Science and Engineering, Classification of materials: Metals, Ceramics and Glasses, Polymers and Composites, Atomic structure & bonding, Crystal geometry and structure, X-ray diffraction, Bragg’s Law for diffraction, Imperfections in crystals, Diffusion in solids, Phase diagram, Phase transformation, Mechanical properties, Electrical and Dielectric properties, Thermal properties, Magnetic properties and Superconductivity, Optical properties, Corrosion & Degradation.

XI. RECOMMENDED BOOK(S):

XII. ASSESSMENT SCHEME:
Quizzes 10%
Midterm Exam 40%
Final Exam 50%
I. COURSE TITLE: Manufacturing Processes

II. COURSE CODE: MED202

III. COURSE CREDITS (L:T:P): 1:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 1:0:2. The course is taught to all the five Engineering disciplines of 2nd Year. Contact hours for one batch = 3 Hrs. No. of batches = 4. Total Contact hours = 12 Hours/week

V. COURSE TYPE (MAJOR/UWE/CCC): Compulsory Engineering Science course for all Majors of Engineering

VI. PREREQUISITE/S (IF ANY): NA

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Course Coordinator: Harender/
Course Instructors:
Theory (Lecture): Harender (For all the batches)
Practical: Santanu Mitra, Nitin Banker, Ramesh Gupta, Siva Sankar Murugan (Each handling practical sessions of one batch)

VIII. SCHOOL/ DEPARTMENT: School of Engineering/ Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Engineering Disciplines

X. COURSE CONTENT:
Carpentry Shop – Basic concepts, Carpentry tools, Carpentry Processes; Fitting Bench Working Shop – Introduction, Fitting tools, Fitting Processes; Welding Shop - Introduction to welding, Types of welding, Metallurgy of Weld; Machine Shop - Introduction to machine tools and machining processes, Types of cutting tools; Sheet Metal Shop- Introduction to sheet metal shop, Metals used in sheet metal works, Hand tools and accessories; Foundry Shop – Introduction, Pattern Materials, Moulding Processes; Metal Forming- Basic metal forming operations & uses; Misc. Processes- Powder-metallurgy process & its applications, Plastic-products manufacturing, Galvanizing and Electroplating

XI. RECOMMENDED BOOK(S):
Manufacturing Processes for Engineering by Kalpakjian S and Steven S, Elements of Manufacturing Processes by B.S. Nagendra and R.K. Mittal,

XII. ASSESSMENT SCHEME:
End Term - 20
Mid Term 1 - 10
Mid Term 2 - 10
Job Submission & Evaluation - 30
Records - 10
Practical Viva/Exam – 20
I. COURSE TITLE: Applied Thermodynamics

II. COURSE CODE: MED301

III. COURSE CREDITS (L:T:P): 2:1:0

IV. TOTAL CONTACT HOURS/WEEK (L:T:P): 2:2:0

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): MED205 Engineering Thermodynamics

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Santanu Mitra/ Santanu Mitra

VIII. SCHOOL/DEPARTMENT: School of Engineering/Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mechanical Engineering

X. COURSE CONTENT:

Unit-I

Unit-II
Condenser: Classification of condenser, Air leakage, Condenser performance parameters

Unit-III
Steam & Gas Nozzles: Flow through nozzle, Variation of velocity, Area and specific volume, Choked flow, Throat area, Nozzle efficiency, Off design operation of nozzle, Effect of friction on nozzle, Super saturated flow.

Unit-IV
Steam Turbines: Classification of steam turbine, Impulse and reaction turbines, Staging, Stage and overall efficiency, Reheat factor, Bleeding, Velocity diagram of simple & compound multistage impulse & reaction turbines & related calculations work done efficiencies of reaction, Impulse reaction Turbines, state point locus, Comparison with steam engines, Losses in steam turbines, Governing of turbines.
Unit-V
Introduction to working of IC engines: Compression Ignition engines, Spark Ignition engines, 2 stroke and 4 stroke engines, Performance parameters of IC engine, Heat balance sheet.

XI. RECOMMENDED BOOK(S):


XII. ASSESSMENT SCHEME:

   Internal Assessment : 20%
   Mid Sem : 30%
   End Sem : 50%
I. COURSE TITLE: Production Technology and Industrial Engineering

II. COURSE CODE: MED302

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:4

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): NA

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Divya Shrivastava/ 1. Divya Shrivastava, 2. Siva Shankar Murugan

VIII. SCHOOL/DEPARTMENT: School of Engineering/ Department of Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mechanical Engineering

X. COURSE CONTENT:

Unit-I
Metal Cutting and Machine Tools:


Unit-II
Unit-III
Introduction to Un-conventional Machining and Welding

Unit-IV
Industrial Engineering: Introduction to Industrial Engineering, IE Tasks, opportunities, changing phases of IE, objectives, scope of IE, IE and production management. Productivity, difference between productivity, efficiency, effectiveness, Types of productivity index, Different form of partial productivity.

Unit V
Work Study: Introduction to work study, work study procedure, concept of work content, reasons for excess work content, techniques to reduce work content.
Method study: introduction to method study, objectives and scope of method study, steps involve in method study, Recording techniques, Different types of Recording charts and diagrams. Motion study and work design, Ergonomics.

Unit VI
Work measurement: Introduction to time study, Time study procedure, Performance rating, Allowances, Computation of standard time, Work sampling, Predetermine motion time analysis (PMTS), Method time measurement (MTM).
Inventory management: Introduction to inventory management, Types of inventories, Objective and function of inventory control, ABC classification, Inventory related cost, Economic order quantity.

XI. RECOMMENDED BOOK(S):

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Title</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maynard’s Industrial Engineering Handbook -</td>
<td>Maynard, Harold Bright and Zandin, Kjell B. (eds.)</td>
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<tr>
<td>2</td>
<td>Industrial Engineering and Management</td>
<td>Ravi Shankar</td>
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### XII. ASSESSMENT SCHEME:

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Mid Term II: 20 for written test, 10 for presentation
I. COURSE TITLE: Heat and Mass Transfer

II. COURSE CODE: MED303

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:4

V. COURSE TYPE (MAJOR/UWE/CCC): Major and UWE (Open to all Engineering Majors)

VI. PREREQUISITE/S (IF ANY): NA

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Nitin Banker/ Nitin Banker

VIII. SCHOOL/DEPARTMENT: School of Engineering/Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mechanical Engineering

X. COURSE CONTENT:

Unit-I
Introduction and basic concepts
Thermodynamics and heat transfer, Heat transfer mechanisms: Conduction, Convection and Radiation, Thermal conductivity, Simultaneous heat transfer
Heat conduction equation
Introduction, One dimensional heat conduction equation, General heat conduction equation, Boundary and initial conditions
Steady heat conduction
Steady heat conduction in plane walls, Thermal contact resistance, Generalized thermal networks, Heat conduction in cylinders and spheres, Critical radius of insulation, Heat transfer from finned surfaces
Transient heat conduction
Lumped system analysis, Transient heat conduction in large plane walls, long cylinders and spheres with spatial effects, Transient heat conduction in semi-infinite solids

Unit-II
Fundamentals of convection
Physical mechanism of convection, Classification of fluid flows, Velocity boundary layer, Thermal boundary layer, Laminar and turbulent flows, Heat and momentum transfer in turbulent flow, Derivation of differential convection equations, Solutions of convection equations for a flat plate, Nondimensionalized convection equations and similarity, Functional forms of friction and convection coefficients, Analogies between momentum and heat transfer
External forced convection
Drag and heat transfer in external flow, Parallel flow over flat plates, Flow across cylinders and spheres, Flow across tube banks
Internal forced convection
Introduction average velocity and temperature, The entrance region, General thermal analysis, Laminar flow in tubes, Turbulent flow in tube
Natural convection
Physical mechanism of natural convection, Equation of motion and the grashof number, Natural convection over surfaces, Natural convection from finned surfaces, Natural convection inside enclosures, Combined natural and forced convection

Unit-III
Boiling and condensation
Boiling heat transfer, Pool boiling, Flow boiling, Condensation heat transfer, Film condensation, Film condensation inside horizontal tubes, Dropwise condensation
Heat exchangers
Fundamentals of thermal radiation
Introduction, Thermal radiation, Blackbody radiation, Radiation intensity, Radiative properties, Atmospheric and solar radiation
Radiation heat transfer
The view factor, View factor relations, Radiation heat transfer: black surfaces, Radiation heat transfer: diffuse, gray surfaces, Radiation shields and the radiation effect, Radiation exchange with emitting and absorbing gases
Mass transfer
Introduction, Analogy between heat and mass transfer, Mass diffusion, Boundary conditions, Steady mass diffusion through a wall, Water vapor migration in buildings, Transient mass diffusion, Diffusion in a moving medium, Mass convection, Simultaneous heat and mass transfer

XI. RECOMMENDED BOOK(S):

1 Heat and Mass Transfer 4 Edition by Yunus A. Cengel, Afshin J. Ghajar
2 Heat and Mass Transfer 3 Edition by P K Nag
4 Heat and Mass Transfer by R.K. Rajput

XII. ASSESSMENT SCHEME:

Internal Assessment: 20%
Mid Sem: 30%
End Sem: 50%
I. COURSE TITLE: Dynamics of Machines

II. COURSE CODE: MED304

III. COURSE CREDITS (L:T:P): 3:0:1

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): 3:0:4

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): MED206 Kinematics of Machines

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Ramesh Gupta/ Ramesh Gupta

VIII. SCHOOL/ DEPARTMENT: School of Engineering/ Mechanical Engineering

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: Mechanical Engineering

X. COURSE CONTENT:

Unit-I
Revision of Kinematics of Machines:
Friction – Continued:
Static Force Analysis
Static equilibrium of two/three force members, Static equilibrium of member with two forces and torque, Static force analysis of linkages

Unit-II
Dynamic Force Analysis
D’Alembert’s principle, Equivalent offset inertia force, Dynamic force analysis of four link mechanism and slider crank mechanism, Engine force analysis-Piston and crank effort
Turning Moment & Flywheel
Turning moment on crankshaft, Turning moment diagrams-single cylinder double acting steam engine, four stroke IC engine and multi-cylinder steam engine, Fluctuation of energy, Flywheel

Unit-III
Balancing of Machines
Static and dynamic balancing, Balancing of several masses in the same plane and different planes, Balancing of reciprocating masses, Balancing of primary force in reciprocating engine, Partial balancing of two cylinder locomotives, Variation of tractive force, swaying couple, hammer blow

Brakes & Dynamometers
Shoe brake, Band brake, Band and Block brake, Absorption and transmission type dynamometers

Unit-IV
Governors
Unit-V  
**Gyroscopic Motion**  
Principles, Gyroscopic torque, Effect of gyroscopic couple on the stability of aero planes & automobiles  
**Mechanical Vibrations**  
Types of vibrations, Degrees of freedom, Single degree free & damped vibrations, Forced vibration of single degree system under harmonic excitation, Critical speeds of shaft

XI. **RECOMMENDED BOOK(S):**


XII. **ASSESSMENT SCHEME:**

<table>
<thead>
<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Quiz/Assignments</td>
<td>10%</td>
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<tr>
<td>Midterm Exam/Lab</td>
<td>40%</td>
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<tr>
<td>Final Exam</td>
<td>50%</td>
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</table>
I. COURSE TITLE: INTRODUCTION TO PHYSICS-I

II. COURSE CODE: PHY101

III. COURSE CREDITS (L:T:P): (3:1:0)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (3:1:0)

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR/UWE

VI. PREREQUISITE/S (IF ANY): Physics and Mathematics at School level.

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S):

i. Dr. Samarendra P. Singh (Course co-ordinator, Instructor)
ii. Dr. S. Kamil (Instructor)
iii. Dr. Santosh Kumar (Instructor)
iv. Dr. Vaibhav Srivastava (Instructor)
v. Dr. Ram Sharma (Instructor)
vi. Dr. Susanta Sinha Roy (Instructor)
vii. Dr. A. K. Tripathi (Instructor)

VIII. SCHOOL/ DEPARTMENT: SCHOOL OF NATURAL SCIENCES/ PHYSICS

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: ALL ENGINEERING, SCIENCES AND HUMANITIES BRANCHES

X. COURSE CONTENT:

i. MECHANICS: The inertial reference frames, Newton’s laws of motion in vector notation, Conservation of energy, Application of Newton’s laws of motion, Dynamical stability of systems: Potential energy diagram, Collisions: Impulse, conservation of energy and linear momentum, Conservation of angular momentum and rotation of rigid bodies in plane,

ii. OSCILLATIONS: Free, damped and forced oscillations

iii. THERMAL PHYSICS: Averages, probability and probability distributions

iv. Thermal equilibrium and macroscopic variables: Pressure of an ideal gas from

v. Newton’s laws - the kinetic theory of gas. Maxwell’s velocity distribution

vi. Laws of Thermodynamics and the statistical origin of the second law of

vii. thermodynamics, Application of thermodynamics: Efficiency of heat engines and

viii. air-conditioners, Thermodynamics of batteries and rubber bands

XI. RECOMMENDED BOOK(S):
Physics for Scientists and Engineers with Modern Physics, Authors: John W. Jewett, 
a. Raymond A. Serway
An Introduction to Mechanics, Authors: Kleppner and Kolenkow,
Feynman Lecture series, Vols. 1 & 3.

XII. ASSESSMENT SCHEME:
Two mid semester exams: 30% (15% each)
Best 2 out of 3 quizzes: 20% (10% each)
Project: 10%
End-semester examination: 40%
I. COURSE TITLE: Fundamentals of Physics -I

II. COURSE CODE: PHY 103

III. COURSE CREDITS (L:T:P): (3:1:1)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (3:1:3)

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): No

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S):

1. Dr. Syed M. Kamil (Course co-ordinator, Instructor),
2. Dr Susant Sinha Roy (Instructor),
3. Dr. Sankar Dhar (Instructor),
4. Dr. A. K. Tripathi (Instructor)

VIII. SCHOOL/ DEPARTMENT: SONS/ Department of Physics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Sciences, Engineering and Humanities disciplines

X. COURSE CONTENT:

- Physics and its relation to other sciences. Time and Distance. Frames of reference and the inertial frames of reference.
- Newton’s laws of motion in one dimension.
- Rotational invariance and vectors. Newton’s laws of motion in three dimension.
- Conservation of energy and momentum.
- Oscillations.
- The Lagrangian method.
- Rotation in two dimensions. Rotation in three dimensions.
- Central forces.
- The Special Theory of Relativity. Space-Time and four vectors.
- Accelerating frames of reference.

XI. RECOMMENDED BOOK(S):

3. Introduction to Classical Mechanics with Problems and Solutions, Morin (Cambridge University Press)

4. The Feynman Lectures on Physics: Volume - 1 (Addison-Wesley)

XII. ASSESSMENT SCHEME:

Theory 60%; Lab 40%

- Theory
  4 monthly tests to be held on the last working Friday of August, September, October, and November: 60%
  Final End Semester Exam: 40%

- Lab
  Continuous evaluation based on viva and lab report: 60%
  Final lab exam: 40%
I. COURSE TITLE: Introduction to Computational Physics

II. COURSE CODE: PHY105

III. COURSE CREDITS (L:T:P): (1:1:0)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (1:1:0)

V. COURSE TYPE (MAJOR/UWE/CCC): Major

VI. PREREQUISITE/S (IF ANY): PHY105

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr Priya Johari

VIII. SCHOOL/ DEPARTMENT: Natural Science/Physics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All sciences and engineering disciplines.

X. COURSE CONTENT:

- **Introduction to Python**: General information, Operators, Functions, Modules, Arrays, Formatting, Printing output, Writing a program

- **Approximation of a function**: Interpolation, Least-squares Approximation

- **Roots of Equations**: Method of Bisection, Method based on Linear Interpolation, Newton-Raphson Method

- **Numerical Differentiation**: Finite Difference Approximation

- **Numerical Integration**: Trapezoidal Rule, Simpson’s Rule

- **Ordinary Differential Equations**: Taylor Series Method, Runge-Kutta Methods, Shooting Method

XI. RECOMMENDED BOOK(S):

1. Computational Physics by Steven E. Koonin
2. An Introduction to Computational Physics by Tao Pang

XII. ASSESSMENT SCHEME:

- Assignments: 15% (Regularly)

- Quizzes (2): 10% (30 mins each, Surprise Quizzes)
<table>
<thead>
<tr>
<th>Assessment Type</th>
<th>Weightage</th>
<th>Timing and Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid Sem I</td>
<td>15%</td>
<td>60 mins, 2\textsuperscript{nd} week of Sep'</td>
</tr>
<tr>
<td>Mid Sem II</td>
<td>15%</td>
<td>60 mins, 2\textsuperscript{nd} week of Oct'</td>
</tr>
<tr>
<td>Project</td>
<td>15%</td>
<td>1 week, 3\textsuperscript{rd} - 4\textsuperscript{th} week of Nov'</td>
</tr>
<tr>
<td>End Sem</td>
<td>30%</td>
<td>120 mins, last week of Nov'</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: Fundamentals of Thermal Physics

II. COURSE CODE: PHY 201

III. COURSE CREDITS (L:T:P): (3:1:0)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (3:1:0)

V. COURSE TYPE (MAJOR/UWE/CCC): Major/UWE

VI. PREREQUISITE/S (IF ANY): PHY103 and PHY104.

OR PHY101, PHY102, PHY207

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S):

Dr. Susanta Sinha Roy (Course co-ordinator, Instructor)
Dr. Vaibhav Srivastava (Instructor)

VIII. SCHOOL/ DEPARTMENT: SNS/ Department of Physics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All sciences and engineering disciplines.

X. COURSE CONTENT:

1. The Kinetic Theory of Gases
   (a) Macroscopic and microscopic description of matter.
   (b) Probability and probability distributions.
   (c) Statistical description of the ideal gas law: Temperature and kinetic energy;
       The distribution of molecular speed; Boltzmann Distribution.
   (d) Applications of kinetic theory.
   (e) Relaxation to equilibrium.

2. Random Walks and Diffusion
   (a) Brownian motion.
   (b) Other examples of random walks in biology and physics.
   (c) Diffusion.
   (d) Application of diffusion in biology and physics.

3. First Law of Thermodynamics
   (a) Thermal equilibrium.
   (b) The first law.
   (c) Illustration: Magnetic work

4. The Second Law of Thermodynamics and its Statistical Interpretation
   (a) Disorder and its measure: Shannon’s formula
   (b) Entropy: The statistical postulate.
   (c) Equilibrium of an isolated system: Temperature
   (d) Illustration: The Schottky defects.
(e) Equilibrium of a system in a heat bath: Boltzmann distribution; Kinetic interpretation of the Boltzmann distribution.

5. Paramagnetism: An Application
   (a) A paramagnetic solid in a heat bath.
   (b) The heat capacity and the entropy.
   (c) An isolated paramagnetic solid.
   (d) Negative temperature.

6. Open Systems, Free Energy and Entropic Forces
   (a) Free energy of a subsystem as the competition between entropy and energy.
   (b) Entropic forces as the derivative of free energy.
   (c) Microscopic view of entropic forces.
   (d) Osmotic pressure and osmotic flow.
   (e) Illustration: Systems with mobile charged ions - The Poisson-Boltzmann equation

7. Applications of Thermodynamics.
   (a) Efficiency of heat engines and air-conditioners.
   (b) Thermodynamics of batteries and rubber bands.
   (c) The phase equilibrium and the Clausius-Clapeyron equation.
   (d) Thermodynamics of a black hole.

8. Systems with Variable Number of Particles
   (a) Chemical potential: Generalization of the Boltzmann distribution for systems with variable number of particles.
   (b) Chemical reactions.
   (c) Kinetic interpretation of complex equilibria.

XI. RECOMMENDED BOOK(S):
1. Statistical Physics, F. Mandl
2. The Feynman Lectures on Physics: Volume I ; Richard P. Feynman, Robert B. Leighton, and Mathew Sands.
4. D.V. Schroeder, “An Introduction to Thermal Physics” (Addison Wesley)
5. Thermal Physics Heat & Thermodynamics, H. P Roy and A. B. Gupta (Allied Publisher)

XII. ASSESSMENT SCHEME:

<table>
<thead>
<tr>
<th>Evaluation Criteria:</th>
<th>Weightage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz</td>
<td>20%</td>
</tr>
<tr>
<td>Midterm evaluation</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>60%</td>
</tr>
</tbody>
</table>
I. COURSE TITLE: INTRODUCTION TO MATHEMATICAL PHYSICS-I

II. COURSE CODE: PHY203

III. COURSE CREDITS (L:T:P): (2:1:0)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (2:1:0)

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR & UWE

VI. PREREQUISITE/S (IF ANY):

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S): Dr. Vikram Vyas

VIII. SCHOOL/ DEPARTMENT: SCHOOL OF NATURAL SCIENCES/ PHYSICS

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Engineering and Science disciplines

X. COURSE CONTENT:
   1. Linear transformations of the plane
      (a) Affine planes and vector spaces
      (b) Vector spaces and their affine spaces
      (c) Euclidean and affine transformations
      (d) Representing linear transformations by matrices
      (e) Areas and determinants
   2. Eigenvectors and eigenvalues
      (a) Conformal linear transformations
      (b) Eigenvectors and eigenvalues
      (c) Markov processes
   3. Linear differential equations in the plane
      (a) Functions of matrices
      (b) Computing the exponential of a matrix
      (c) Differential equation and phase portraits
      (d) Applications of differential equations
   4. Scalar products
      (a) The euclidean scalar product
      (b) Quadratic forms and symmetric matrices
      (c) Normal modes
      (d) Normal modes in higher dimensions
      (e) Special relativity: The Poincare’ group and the Galilean group
   5. Calculus in the plane
      (a) The differential calculus and the examples of the chain rule: the Born approximation and Kepler motion
      (b) Partial derivatives and differential forms.
      (c) The pullback notation
      (d) Taylor’s formula
      (e) Lagrange multiplier
   6. Double integrals
      (a) Exterior derivative
(b) Two-forms
(c) Pullback and integration for two-forms
(d) Two-forms in three space
(e) Green’s theorem in the plane

XIII. RECOMMENDED BOOK(S):

A course in mathematics for students of physics: Volume 1; Paul Bamberg and Shlomo Sternberg

XIV. ASSESSMENT SCHEME:

Evaluation Criteria:
Weekly tests 50%
Midterm evaluation 25%
Final Exam 25%
I. COURSE TITLE: WAVES AND OSCILLATIONS

II. COURSE CODE: PHY205

III. COURSE CREDITS (L:T:P): (3:1:0)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (3:1:0)

V. COURSE TYPE (MAJOR/UWE/CCC): MAJOR & UWE

VI. PREREQUISITE(S) (IF ANY): PHY103, PHY104; OR PHY101, PHY102, PHY207

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S):

Dr. Samarendra P. Singh (Course co-ordinator)
Dr. Susanta Sinha Roy (Instructor)

VIII. SCHOOL/DEPARTMENT: SCHOOL OF NATURAL SCIENCES/ PHYSICS

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Engineering and Science disciplines

X. COURSE CONTENT:

1. Oscillations of Systems with Many Degrees of Freedom
   (a) Review of the Harmonic Oscillator
   (b) Systems with More than One Degree of Freedom
   (c) Linearity, Normal Modes and the Matrix Equation of Motion
   (d) Forced Oscillations and Resonance in Systems with More than One Degree of Freedom
   (e) The Infinite System and Translational Invariance
   (f) Forced Oscillations and Boundary Conditions

2. Traveling Waves
   (a) The Continuum Limit of a Discrete System
   (b) Longitudinal Oscillations and Sound
   (c) Harmonic Traveling Waves in One Dimension Phase Velocity
   (d) Index of Refraction and Dispersion
   (e) Impedance and Energy Flux

3. Modulations, Pulses, and Wave Packets
   (a) Group Velocity
   (b) Pulses
   (c) Fourier Analysis of Pulses
   (d) Fourier Analysis of Traveling Wave Packet

4. Waves in Two and Three Dimensions
   (a) Harmonic Plane Waves and the Propagation Vector
   (b) Water Waves
   (c) Electromagnetic Waves
   (d) Radiation from a Point Charge

5. Polarization
   (a) Description of Polarized States
   (b) Production of Polarized Transverse Waves
(c) Double Refraction  
(d) Bandwidth, Coherence Time, and Polarization  
6. Interference and Diffraction  
   (a) Interference between Two Coherent Point Sources  
   (b) Interference between Two Independent Sources  
   (c) How Large Can a “Point” Light Source Be?  
   (d) Angular Width of a “Beam” of Traveling Waves  
   (e) Diffraction and Huygen’s Principle  
   (f) Geometrical Optics  

XV. RECOMMENDED BOOK(S):  

2. The Physics of Waves, Howard Georgi (Free Online Version)  

XVI. ASSESSMENT SCHEME:  

- Quizzes: Best two (from three quizzes): 20 % (10% each)  
- Assignments: Two assignments (from three assignments)  
  10% (5% each)  
- Mid-term examination: 15 %  
- Project: 15%  
- End-semester examination: 40%
I. COURSE TITLE: Abridged Course for Minor Physics

II. COURSE CODE: PHY 207

III. COURSE CREDITS (L:T:P): (3:1:0)

IV. TOTAL CONTACT HOURS/ WEEK (L:T:P): (3:1:0)

V. COURSE TYPE (MAJOR/UWE/CCC): UWE

VI. PREREQUISITE/S (IF ANY): PHY 101, PHY 102

VII. COURSE COORDINATOR(S)/INSTRUCTOR(S):

   Dr. Santosh Kumar (L),
   Dr. Vaibhav Shrivastava (T)

VIII. SCHOOL/ DEPARTMENT: School of Natural Sciences/ Department of Physics

IX. DISCIPLINES TO WHICH THE COURSE MAY BE OF INTEREST: All Sciences and Engineering disciplines

X. COURSE CONTENT:

   PHY207 is a bridge course specially designed for students who have already taken PHY101 and PHY102 instead of PHY103 and PHY104. The course supplements and develops their understanding of Newtonian physics and classical electromagnetism. The content is as follows:

   - Review of Newtonian mechanics
   - Solving planetary motion using a personal computer
   - A brief introduction to Lagrangian formulation of mechanics
   - Review of simple harmonic motion
   - Introduction to coupled oscillators and normal modes
   - Introduction to special theory of relativity, space-time diagrams and four vectors
   - Review of electrostatics and magnetostatics
   - Review of Maxwell’s equation
   - Wave equation from Maxwell’s equation, plane wave solution, polarization
   - Light as an electromagnetic wave

XI. RECOMMENDED BOOK(S):

   - Berkeley Physics Course: Volume - 1: Mechanics (McGraw-Hill)
   - An Introduction to Mechanics, Kleppner and Kolenkow (McGraw-Hill)
- Introduction to Classical Mechanics with Problems and Solutions, Morin (Cambridge University Press)
- The Feynman Lectures on Physics: Volume – 1 (Addison-Wesley)
- Fundamentals of Physics, Halliday, Resnick, and Walker (Wiley)
- Physics for Scientists and Engineers with Modern Physics, John W. Jewett and Raymond A. Serway (Brooks/Cole)
- Classical Mechanics (3rd Edition), Herbert Goldstein, Charles P. Poole Jr., John L. Safko (Addison-Wesley)

XII. ASSESSMENT SCHEME:

One mid semester exam: 25%
Best 2 out of 3 quizzes: 15% (7.5% each)
End-semester examination: 60%