COURSE OUTLINES

Introduction to Software Engineering

Course Code: SE-221  Credit Hours: 3

Objectives: To study various software development models and phases of software development life cycle. The concepts of project management, change control, process management, software development and testing are introduced through hands-on Team Projects.

Course Outline: Introduction to Computer-based System Engineering; Project Management; Software Specification; Requirements Engineering, System Modeling; Requirements Specifications; Software Prototyping; Software Design: Architectural Design, Object-Oriented Design, UML modeling, Function-Oriented Design, User Interface Design; Quality Assurance; Processes & Configuration Management; Introduction to advanced issues: Reusability, Patterns; Assignments and projects on various stages and deliverables of SDLC.

Reference Material:

OBJECT ORIENTED SOFTWARE ENGINEERING

Course Code: SE-XXX  Credit Hours: 3

Objectives:

Course Outline:

Reference Material:
SOFTWARE REQUIREMENTS AND SPECIFICATIONS

Course Code: SE-XXX Credit Hours: 3

Objectives:
Course Outline:
Definition of Requirements Engineering and role in system development, Fundamental concepts and activities of Requirements Engineering. Information elicitation techniques, Modeling scenarios, Fundamentals of goal-oriented Requirements Engineering, Modelling behavioral goals, Modelling quality goals, Goal modelling heuristics, Object modelling for Requirements Engineering, Object modelling notations, Object modelling heuristics, Identifying objects from goals, Modelling Use Cases and state machines, Deriving operational requirements from goals, Requirements Specification, Requirements verification and validation, Management of inconsistency and conflict, Techniques for requirements, evaluation, selection and prioritization; Requirements management; Requirements traceability

Reference Material:
- David T., Software Requirements Specification, CreateSpace Independent Publishing Platform, 2010

SOFTWARE PROJECT MANAGEMENT

Course Code: SE-324 Credit Hours: 3

Objectives:
- To learn the techniques required to plan, organize, monitor and control software projects
- To learn, how to managing people, process and problems during a software project
- Relating software metrics with software projects
- Estimating effort, cost and project duration
- Risk assessment techniques
- Project scheduling
- Project quality management
- Formal Technical Reviews (FTRs)
- Change management during software development and after delivery to customer

Course Outline
Introduction to Software Project Management, Project management profession, Importance of certification and ethics, and the growth of project management software, Five project management (PM) process groups, Metrics for Process & Projects, Software Measurement, Software Quality Metrics, Defect Removal Efficiency, Integrating Metrics with the Software Process, Establishing a software metrics program, Project Integration Management, Project Scope Management, Estimation and Risk, Project Planning Activities, The Software Equation, The Make/Buy Decision, Outsourcing

Reference Material:
- Andrew S., Jennifer G.,Applied Software Project Management, online ed., O'Reilly Media,
Software Design and Architecture

Course Code: SE-322
Credit Hours: 3

Course Outline:
Introduction to the discipline of design, generic design processes, and design management; software product design, including analysis activities such as needs elicitation and documentation, requirements development activities such as requirements specification and validation, prototyping, and use case modelling; engineering design analysis, including conceptual modelling and both architectural and detailed design; survey of patterns in software design, including architectural styles and common mid-level design patterns.

Reference Materials:

SOFTWARE VERIFICATION AND VALIDATION

Course Code: SE-XXX
Credit Hours: 3

Objectives:

Course Outline:
Introduction to software quality assurance, The Quality Challenge, QualityControl v/s Quality Assurance, Quality Assurance in Software Projects, (Phases), Principles and Practices, Quality Management, Quality Assurance and Standards, Quality Planning and Quality Control, Verification and Validation, Planning Verification and Validation, Critical System Validation, Reliability Validation, Safety Assurance, Security assessment, Inspections and reviews, Principles of software validation, Software verification, Planning for Software Quality Assurance, Software Quality Assurance (SQA) Plans, SQA-O rganizational Level Initiatives, SQA Planning (Observations, Numbers, Results), Software Testing, Specification based test construction techniques, White-box and grey-box testing, Others comprehensive software testing techniques for SDLC, Control flow oriented test construction techniques, Dataflow oriented test construction techniques, Clean-room approach to quality assurance, Product Quality and Process Quality, Standards for process quality and standards for product quality, Walkthroughs and Inspections, Structure, Checklist, Audits, Roles and Responsibilities (Reviews, Inspections, etc), How to make Reviews and Inspections most effective

Reference Material:
- Gerald M. Weinberg, Perfect Software: And other illusions about testing, ed, Dorest

DIGITAL IMAGE PROCESSING

Course Code: SE-334
Credit Hours: 3

Objectives: This course introduces the basic theories and methodologies of digital image processing. Topics include intensity transformations for image enhancement, two-dimensional discrete Fourier transform, spatial and frequency domain linear image filtering, nonlinear image filtering, binary image processing, edge detection, image segmentation, and digital video processing basics. This course makes extensive use of MATLAB as an analysis, design, and visualization tool.

Course Outline:

Reference Material:

VISUAL PROGRAMMING

Course Code: SE-303
Credit Hours: 4 (3+1)

Objectives:

By the end of this subject students would:
• Be familiar with the fundamental principles of event-driven programming, recognize its advantages and be able to use the main features of an integrated development environment
• Be able to use forms, controls, menus and dialog boxes, modify their properties, write code for their events and employ their methods
• Have the ability to experiment with and use new controls, properties, events and methods
• Be able to design, develop and test fully functioning and well-behaved windows applications using the Visual C# programming language
• Be able to describe, discuss and apply the main theories, models and methodologies of Human Computer Interaction
• Have the ability to design and implement effective and usable graphical user interfaces

Course Outline:

Reference Material:
• John S., Microsoft Visual C# Step by Step, viii ed., Barnes & Noble’s, 2015, ISBN 9781509301041

FORMAL METHODS IN SOFTWARE ENGINEERING

Course Code: SE-426 Credit Hours: 3

Objectives:
Upon successful completion of this course, students would be able to:
• Understand the basics of Hoare’s logic.
• Write program specifications in terms of pre- and post-conditions.
• Use formal techniques for verification of programs.
• Use formal techniques for derivation of programs from their formal specifications.
• Learn Design by Contract and Object Constraint Language (OCL).
• Develop basic understanding of Algebraic and Model based specifications.
PROFESSIONAL PRACTICES
Course Code: SS-301 Credit Hours: 3


Reference Material:

DATA STRUCTURE AND ALGORITHMS
Course Code: SE-203 Credit Hours: 4

Objectives:
“An apprentice carpenter may want only hammer and saw, but a master craftsman employs many precision tools. Computer programming likewise requires sophisticated tools to cope with complexity of real applications and only practice with these tools will build skill in their use.
(Robert L. Kruse Data Structure and Program Design)”. This subject deals to make students convenient in building a memory and time efficient data structures for the implementation of large-scale (data intensive) computer systems.

**Course Outline**

**Reference Material:**

**PSP/TSP**

**Course Code:** SE-452  
**Credit Hours:** 3

**Objectives:**
Successful completion of this course enables participants to understand different software process models and describe how the use of operational procedures and data can effectively be used by teams and individuals can improve software development activities and provide positive motivation for engineers and teams. Demonstrate key behaviors for successfully leading and coaching teams. Show how to quantitatively manage projects through the use of effective cost, schedule and quality measures. Describe the basic concepts on which the TSP is built provide a working level understanding of how individuals and teams apply the TSP

**Course Outline**
quality assurance, Changing view of quality, Software quality management, Software quality management activities, Quality conflicts, Quality assurance and standards, Capability Maturity Model, Reviews and inspection, Quality review, Software Review Process, Program inspection, Inspection checklist, How the PSP was developed, Principles of PSP, Defining a personal process, Personal planning and quality management, Personal estimating and scheduling, In-process control and tracking, PSP data gathering, Time measurement, Size measurement, Software quality, PSP quality management, Defect management, PSP evolution, Process analysis and improvement, Team Software Process, Operational team process, Launching a TSP team, TSP team working process, TSP Quality Management

Reference Material:

WEB ENGINEERING

Course Code: SE-314 Credit Hours: 3

Objectives:
Upon successful completion of the course the student will:
• Be able to understand the concepts, principles and methods of Web engineering.
• Be able to apply the concepts, principles, and methods of Web engineering to Web applications development.
• Be familiar with current Web technologies.
• Be familiar with Web application development software tools and environments currently available on the market.

Course Outline
XML, XSL, XLink, DOM, SMIL RDF, RDF-SCHEMA, Web 3.0 and the semantic web, Web Searching, web services.

Reference Material:

SOFTWARE CONSTRUCTION

Course Code: SE-222 Credit Hours: 3

Objectives:
This course begins with basic understandings of overall structure of a compiler, and then digs into the details of a number of important techniques commonly used in compiler construction. Students will also learn major techniques that are used to translate code from high-level language
to machine language. This course includes

- Review formalisms for describing the syntax and semantics of (imperative) programming language.
- Study the fundamental algorithms used in compiler construction
- Design simple languages and protocols using suitable tools
- Create code for simple languages and protocols using suitable tools

Analyze software to improve its efficiency, reliability and maintainability

**Course Outline**


**Reference Material:**


**OPERATING SYSTEMS**

**Course Code:** SE-205  
**Credit Hours:** 3

**Objectives:**
The course will start with a brief historical perspective of the evolution of operating systems over fifty years, and then cover the major components of most operating systems. This discussion will tradeoffs that can be made between performance and functionality during the design and implement an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), file systems, and operating system support for distributed systems.

**Course Outline**

Introduction to Computing

Course Code: SE-107  
Credit Hours: 3

Objectives:

- Understand different terms associated with ICT
- Identify various components of a computer system
- Identify the various categories of software and their usage
- Define the basic terms associated with communications and networking
- Understand different terms associated with the Internet and World Wide Web.
- Use various web tools including Web Browsers, E-mail clients and search utilities.
- Use text processing, spreadsheets and presentation tools
- Understand the enabling/pervasive features of ICT

Course Outline


Reference Material:

Course Name: Software Engineering Economics
Course Outline:

Reference Materials:

Course Name: Information System Audit
Course Outline:
IS Audit charter, Polices, Procedures, Audit computer networks and communication, Auditing software development, Acquisition, Maintenance, Auditing IT infrastructure, Auditing
Management and Organization, Business process re-engineering: IS audit proposal, report, evidence and follow-up, complaint to standard, Enterprise service agreement, IP pro count policies and process, Backup and procedures

Reference Materials:

Course Name: Business Process Re-Engineering

Course Outline:
Why Focus on Business Processes? Setting the Stage for Business Process; Organizing for Process Improvement; Flowcharting: Drawing a Process Picture; Understanding the Process Characteristics; Streamlining the Process; Measurements, Feedback, and Action; Process Qualification; Measurements, Feedback, and Action.

Reference Materials:

Course Name: Secure Software Systems

Course Outline:
Different techniques to prevent or detect problems including: threat modeling, check lists and coding standards, To grasp static analysis tools, Understand code reviews, typing and static analysis, To comprehend language-based security (or platform-based security), security middleware and runtime monitoring.

Reference Materials:

Programming Fundamentals

Course-Code: SE-105 Credit Hours: 4

Objectives: The course is designed to familiarize students with the basic structured programming skills. It emphasizes upon problem analysis, algorithm designing, and programme development and testing.

Course Outline: Overview of computers and programming. Overview of language for e.g. C ++.
Basics of structured and Modular programming. Basic Algorithms and problem solving, development of basic algorithms, analyzing problem, designing solution, testing designed solution. Fundamental programming constructs, translation of algorithms to programmes, data types, control structures, functions, arrays, records, files, testing programmes.

Reference Material:


Object Oriented Programming

Course Code: SE-103  Credit Hours: 4 (3 + 1)

Objectives:
By the end of the course, students should be able to:
- Designing classes and their functionalities using OOP design
- Understand and apply inheritance techniques to their programs
- Overload and override methods and understand differences between them
- Can Exploit Power of Polymorphism in Development.
- Create and Using UML diagrams
- Understand the strengths and weaknesses of Structural/OO programming.
- File Handling, binary and textual

Course Outline
The Big Picture, Beginning of programming, Structured programming, Why Do We Need Object-Oriented Programming?, Object oriented programming, Characteristics of Object-Oriented Languages, Objects, Classes, Inheritance, Reusability, Data Abstraction, Data Encapsulation, Creating new data types, Polymorphism and overloading, Structure basics, Structure within structure, Structures and classes Comparison, Enumerations, Objects and classes, Access specifier, Constructors, Destructors, Object as function argument, Overloaded constructor, The default copy constructor, Functions and functions overloading, Revision Function overloading, Operator overloading, Inheritance, Derived class and base class, Inheritance and Constructors, Base class Constructors, Derived class constructors, Constructor and member functions, Abstract base class, Multiple inheritance, Ambiguity in multiple inheritance, Containership: classes within class, Composition and aggregation, Pointers, Pointer and arrays, Pointers and functions, Memory management: new and delete, Pointer to objects, Virtual functions, Late binding, Abstract classes and pure virtual functions, Virtual destructors, Virtual base classes, Polymorphism, Type of Polymorphism, Streams and files, Stream classes, Error handling in file I/O, File I/O with member functions, Multi file programs, Reason for multi file program, Creating a multi file program, Templates and exceptions, Functions templates, Exception, Why do we need exception.
Reference Material:


Discrete Structures

Course Code: SE-261
Credit Hours: 3

Course Outline:
Mathematical reasoning: introduction to logic, propositional and predicate calculus; negation disjunction and conjunction; implication and equivalence; truth tables; predicates; quantifiers; natural deduction; rules of Inference; methods of proofs; use in program proving; resolution principle; Set theory: Paradoxes in set theory; inductive definition of sets and proof by induction; Relations, representation of relations by graphs; properties of relations, equivalence relations and partitions; Partial orderings; Linear and wellordered sets; Functions: mappings, injection and surjection, composition of functions; inverse functions; special functions; Peano postulates; Recursive function theory; Elementary combinatorics; counting techniques; recurrence relation; generating functions.

Graph Theory: elements of graph theory, Planar Graphs, Graph Colouring, Euler graph, Hamiltonian path, trees and their applications.

Reference Materials:

DIGITAL LOGIC AND DESIGN

Course Code: SE-XXX
Credit Hours: 3

Course Outline:
Number Systems, Logic Gates, Boolean Algebra, Combination logic circuits and designs, Simplification Methods K-Maps, Quinne, Mc-Cluskey,, Flip Flops and Latches, Asynchronous and Synchronous circuits, Counters, Shift Registers, Shift Registers Counters, Triggered devices & its types. Binary Arithmetic and Arithmetic Circuits, Memory Elements, State Machines. Introduction Programmable Logic Devices (CPLD, FPGA); Lab Assignments using tools such as Verilog HDL/VHDL, MultiSim, etc.

Reference Materials:
INTRODUCTION TO DATABASE SYSTEMS

Course Code: SE-XXX
Credit Hours: 4
Course Outline:
Basic database concepts, Database Architecture, DB Design Life Cycle, Schema Architecture, Conceptual, Logical and physical database Modelling and design, Entity Relationship diagram (ERD), Enhanced ERD, Relational data model, mapping ERD to relational model, Functional dependencies and Normalization, Relational Algebra, Structured Query language (SQL), Transaction processing, concurrency control and recovery techniques, Query optimization concepts.

Reference Material:

MODELING & SIMULATION

Course Code: SE-441
Credit Hours: 3
Objectives:
Describe the concepts, principles and perspectives that underpin business analysis and the development of associated models. Produce conceptually sound models that represent typical business analysis problems using appropriate business analysis tools and techniques. Critically evaluate issues and problems that arise during the representation of organizational processes and knowledge while providing reasoned explanations to attempt to resolve them.
**Course Outline**

Introduction to Modeling & Simulation, Introduction to Business Analysis, Demonstrate familiarity with MS Visio, Introduction to BPMN, Model some sample scenarios using intermediate BPMN concepts, Events, Gateways, Model some sample scenarios using intermediate BPMN concepts, Pools, Lanes, Orchestration, Collaboration, Message Flows, Choreography, Black & White Box Pools, Model some sample scenarios using intermediate BPMN concepts, Sub-processes, Loops, Artefacts, Annotations, Groups, Associations, Data elements, Introduction to Simul8 Installation, Explain the purposes, benefits and outcomes of simulation modeling, How to do simulation modelling with Simul8? Building a simple simulation model with Simul8, KPIs, Prioritizing, Labels, Resource handling, Demonstration of Projects, Demonstration of Projects

**Reference Material:**


**HUMAN AND COMPUTER INTERACTION**

**Course Code:** SE-402  **Credit Hours:** 3

**Objectives:**

- To provide an introduction to the fundamental concepts in human-computer interaction.
- To learn how to design and evaluate user interfaces for computer-based systems and devices.
- To develop usable and interactive computing systems for a wide range of end-users having diverse backgrounds and capabilities

**Course Outline**

ARTIFICIAL INTELLIGENCE

Course Code: SE-403  Credit Hours: 3

Objectives:
On the completion of this course students would be able to meet following objectives. Degree of student’s competence in these objectives will determine his/her grade in the subject as mentioned against each skill.

- Understand needs and appreciate the use of artificial intelligence techniques in current socio-technical world.
- Understand the concepts and methodology required to build an artificially intelligent system.
- Understand the potentials and limitations of different computational mechanism which can produce intelligent behaviour
- To be able to apply different tools and techniques in the design of artificially intelligent systems.
- To demonstrate learned skills in the form of an artificially intelligent artefact.

Course Outline
Reference Material:


COMPUTER COMMUNICATION AND NETWORKS

Course Code: SE-XXX Credit Hours: 4

Objectives:

- To provide students with a comprehensive introduction to fundamental concepts of data communication and computer networks for building a sound foundation for subsequent courses in the field of networking.
- To introduce the layered architecture approach with reference to OSI Model.
- To examine the characteristics of different transmission media.
- To understand the basic encoding and modulation techniques.
- To understand various error detection, flow and error control techniques.
- To introduce basic network devices and LAN technologies.
- To provide fundamental concepts of switched networks.
- To provide the IP addressing concepts and subnetting skills.
- To provide hands on experience of basic Computer Utility Tools
- To provide the necessary skills for LAN implementation.
- To provide basic introduction on Network Simulation and Analysis Tools
- To provide basic concepts of System and Network Programming

Course Outline


Reference Material:


RESEARCH METHODOLOGY

Course Code: IT-403 Credit Hours: 3

Objectives:
Providing basic research and working skills, facilitating a smoother transition to graduate studies and research. The course spans multiple elements including time management, writing and presentation skills, and general considerations for experiment design and planning.

• Introduce basic concepts in research methodology.
• Study research methodology for computer science and engineering.
• Now graduate studies, the research society and research policy.

Course Outline:

Reference Material:

Introduction to Grammar

<table>
<thead>
<tr>
<th>Course Code: ENG-101</th>
<th>Course Title: Introduction to Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor:</td>
<td>Semester: <strong>Spring, 2016</strong></td>
</tr>
<tr>
<td>Email:</td>
<td>Office (Room No):</td>
</tr>
<tr>
<td>Minor: BS English</td>
<td>Credit Hours: 3</td>
</tr>
</tbody>
</table>

**Course Description**
Functional English which would enable the students to meet their real life language needs:
- Basics of Grammar (parts of speech and use of articles)
- Sentence Structure
- Tenses
- Active and Passive Voice
- Punctuation
- Correction of Errors
- Direct/Indirect

**Note:** The mode of instruction must be in English.

**Course Type:** Compulsory

**Pre-requisites**
Basic knowledge of English grammar and its usage.

**Goals**
- To enable the students to comprehend grammatical terms and use them properly
- To enhance their Listening and Speaking skills
- To develop their critical thinking

<table>
<thead>
<tr>
<th>Text Books</th>
<th>Provision of hand outs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended Books</strong></td>
<td></td>
</tr>
<tr>
<td>• “Practical English grammar” by Thomas and Martinet</td>
<td></td>
</tr>
<tr>
<td>• “Writing. Intermediate” by Marie-Christine Boutin, Suzanne Brinand and Francoise Grellet</td>
<td></td>
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<tr>
<td>• “Reading. Upper Intermediate.” by Brain Tomlinson and Rod Ellis</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lectures</th>
<th>32 sessions of 90 minutes each</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attendance Policy</strong></td>
<td>A minimum of 70% attendance is required for a student to be eligible to take the final examination. The students with less than 70% of the attendance in a course shall be given the grade SA (Short Attendance) in such a course and shall not be allowed to take its End Term Exams and will have to reappear in the course to get the required attendance to be eligible to sit in the exam when the course is offered the next time.</td>
</tr>
<tr>
<td><strong>Grading</strong></td>
<td>The course will be evaluated on the basis of the following percentage:</td>
</tr>
<tr>
<td>• Mid Term</td>
<td>25%</td>
</tr>
<tr>
<td>• Sessional</td>
<td>25%</td>
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<tr>
<td>o Presentations</td>
<td>10%</td>
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<tr>
<td>o Listening Test</td>
<td>10%</td>
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<tr>
<td>o Quiz</td>
<td>05%</td>
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<tr>
<td>• Final term</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Quiz, Listening Exercise and Presentation Schedule (tentative)</strong></td>
<td>According to the decision of instructor</td>
</tr>
</tbody>
</table>

**English Language Skills**

<table>
<thead>
<tr>
<th>Course Code: ENG-102</th>
<th>Course Title: English Language Skills</th>
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</thead>
<tbody>
<tr>
<td>Instructor:</td>
<td>Semester: Spring, 2016</td>
</tr>
<tr>
<td>Email:</td>
<td>Office (Room No):</td>
</tr>
<tr>
<td>Minor: BS English</td>
<td>Credit Hours: 3</td>
</tr>
</tbody>
</table>
**Course Description**

Functional English which would enable the students to meet their real life language needs:

- Integrated language skills: Listening, Speaking, Reading and Writing skills
- Comprehension
- Report Writing
- Presentation Skills
- Précis writing
- Paragraph Writing
- Story Writing
- Interview Skills

**Note:** The mode of instruction must be in English.

**Course Type:**

<table>
<thead>
<tr>
<th>(Compulsory/Core/Elective)</th>
<th>Compulsory</th>
</tr>
</thead>
</table>

**Pre-requisites**

Basic knowledge of English grammar and its usage.

**Goals**

- To enable the students to meet their real life communication needs
- To enhance their Listening and Speaking skills
- To develop their critical thinking

**Text Books**

Provision of hand outs

**Recommended Books**

- Practical English grammar” by Thomas and Martinet
- “Writing. Intermediate” by Marie- Christine Boutin, Suzanne Brinand and Francoise Grellet
- “Writing. Upper Intermediate” by Rob Nolasco
- “Reading. Upper Intermediate.” by Brain Tomlinson and Rod Ellis
- “reading and study Skills” by John Langan
- “Study Skills” by RiachardYorky

**Lectures**

32 sessions of 90 minutes each
### Attendance Policy

A minimum of 70% attendance is required for a student to be eligible to take the final examination. The students with less than 70% of the attendance in a course shall be given the grade SA (Short Attendance) in such a course and shall not be allowed to take its End Term Exams and will have to reappear in the course to get the required attendance to be eligible to sit in the exam when the course is offered the next time.

### Grading

The course will be evaluated on the basis of the following percentage:

- Mid Term 25%
- Sessional 25%
  - Presentations 10%
  - Listening Test 10%
  - Quiz 05%
- Final term 50%

### Quiz, Listening Exercise and Presentation Schedule (tentative)

According to the decision of instructor

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## Technical and Business Writing

### Course Code: ENG-310  
Course Title: Technical and Business Writing

<table>
<thead>
<tr>
<th>Instructor:</th>
<th>Semester:</th>
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</thead>
<tbody>
<tr>
<td>Email:</td>
<td>Office (Room No):</td>
</tr>
</tbody>
</table>

### Course Description

Functional English which would enable the students to meet their real life language needs:

- Business Letter
- Memoranda
- Proposal Writing
- Preparing and Delivering Presentations

**Note:** The mode of instruction must be in English.

### Course Type: (Compulsory/Core/Elective)

Compulsory

### Pre-requisites

Basic knowledge of English grammar and its usage.

### Goals

- Develop appropriate frameworks for technical writing skills
- Evaluate and adapt materials for teaching the subject
- Develop appropriate assessment strategies for testing
| **Text Books** | Provision of hand outs |
| **Recommended Books** | |
| **Lectures** | 32 sessions of 90 minutes each |
| **Attendance Policy** | A minimum of 70% attendance is required for a student to be eligible to take the final examination. The students with less than 70% of the attendance in a course shall be given the grade SA (Short Attendance) in such a course and shall not be allowed to take its End Term Exams and will have to reappear in the course to get the required attendance to be eligible to sit in the exam when the course is offered the next time. |
| **Grading** | The course will be evaluated on the basis of the following percentage: |
| | • Mid Term 25% |
| | • Sessional 25% |
| | o Presentations 10% |
| | o Listening Test 10% |
| | o Quiz 05% |
| | • Final term 50% |
| **Quiz, Listening Exercise and Presentation Schedule (tentative)** | According to the decision of instructor |

**Linear Algebra**

**Course Code:** MATH-314  
**Credit Hours:** 3  

**Course Outline:**  
Vectors, Vector spaces, Matrices & Determinants, Cofactor and Inverse, Rank, Linear independence, Solution of system of linear systems, Positive Definite matrix, Linear Transformations, Operations on matrices, Inner products, Orthogonality and least squares, Eigen value & Eigenvectors, Applications to systems of equations and to Geometry, Singular Value Decomposition.  

**Recommended Books**  
Calculus and Analytic Geometry.

Course Code: MATH-110  Credit Hours: 3

Course outlines:

Complex Numbers, simple Cartesian curves, functions and graphs, symmetrical properties, curve tracing, limit and continuity, differentiation of functions, derivative as slope of tangent to a curve and as rate of change, application to tangent and normal, maxima/minima and point of inflexion, Taylor and Malaren expansion, Integration, Indefinite Integration, methods of Integration (by substitution, by parts, and by partial fractions), definite integral, application to area, arc length and volume.

Recommended Books:


Multivariable Calculus.

Course Code: SE-110  Credit Hours: 3

Course outlines:


Recommended Books:


Entrepreneurship

Course Code: MGT-303  Credit Hours: 3

Course Description
This course is basically meant to provide an insight to essence of Entrepreneurship. Course focuses on examination and recognition of the key concepts, methods of analysis, strategies, tools and techniques that are essential for entrepreneurship. The course is designed to give an overview of skills, aptitudes, abilities characteristic of successful entrepreneurs. The course will cover design, creativity and entrepreneurship, the characteristics of, and types of entrepreneurs’ pathways to entrepreneurship and requirements for success. This course focuses on ways in which entrepreneurs recognize opportunities, generate ideas, and organize resources to plan successful ventures that enable them to achieve their goals. The Business project enables the students to apply the concepts and generalizations, learned through the course, to a real life product or service. The course consists of didactic lectures, readings from the text book, case studies, assignments, presentations and projects.

Course Objectives
At the end of the course, students will be able to:

1. Understand and utilize various methods of generating business ideas
2. Generate realistic new ideas and identify opportunities of successful entrepreneurial plans.
3. Analyze resources required to run their proposed plan.
4. Examine the environment and gather information required on factors affecting their proposed business.
5. Prepare a business project plan having considered all practical aspects
6. Present the business plan in the most efficient way
7. Work as productive member of a entrepreneurial team

Course Outcomes
On successful completion of the course, students are expected to acquire the following competencies:

1. Ability to comprehend and use key concepts, tools and strategies of entrepreneurship.
2. Make optimal utilization of available resources as an entrepreneur.
3. Scan, evaluate and communicate innovate business ideas effectively
4. Work in teams with cooperation, dedication and commitment.
5. Critically evaluate the entrepreneurial policies and practice of organizations around the globe through case studies.
6. Analyze and make the optimal decision about current market issues and problems.
7. Understand and respond to emerging trends in the local and global market.

Course contents

- The entrepreneurial perspective
- International entrepreneurship opportunities
- Creativity and the business idea
- Legal issues
- Creating and starting business venture
- Financing the new venture
- Managing, growing and ending the new venture

RECOMMENDED BOOKS

Text book:
- Entrepreneurship: by Robert D. Hisrich, Michael P. Peters and Dean A. Shepherd. Seventh or latest edition available.

Reference Books:
- The Successful Business Plans Secrets and Strategies: by Rhonda Abrams

DETAILED COURSE OUTLINE

<table>
<thead>
<tr>
<th>Week</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Nature and Importance of Entrepreneurs</td>
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<tr>
<td></td>
<td>1. nature and development of entrepreneurship,</td>
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Fundamentals of Accounting

Course Code: MGT-205  Credit Hours: 3

COURSE DESCRIPTION:

The course provides students with an understanding of the basic concepts, principles, procedures and techniques underlying the accounting process so as to equip them with a foundation for studies of other accounting courses. Various techniques are used to study financial accounting concepts which include the use of financial statement problem sets, case studies and other materials. The course comprises didactic lectures, three assignments and a 'project'. Students are given real time business examples about different financial accounting issues faced by different organizations.

COURSE OBJECTIVES:

At the end of the course, the students will be able to:

- Describe Accounting concepts
- Describe General Accepted Accounting Principal (GAAP)
- Explain the rules for accounting
- Analyze the business transactions
- Prepare the worksheet
- Interpret the financial statements

LEARNING OUTCOMES:

The course develops the following competencies in the students:

- The capability to evaluate basic accounting and purpose of accounting.
- A sense of ability for judge of accounting rules
- Ability to evaluate different business and business transactions.
- The skill to prepare different financial statements.

COURSE CONTENT:

- Introduction to Accounting
- Transaction and accounting equation
- Analysis of business transaction and double entry system
- Completing the Accounting Cycle
- Final accounts: The completion of accounting cycle
- Accounting for Merchandising Operations
- Work sheet
- Inventories and Cost of Sales
- Cash and Internal Controls
- Accounting for Receivables
- Plant Assets, Natural Resources and Intangibles
- Liabilities for organization
- Accounts for corporation
- Statement of Cash Flows

TEXT BOOKS:

REFERENCE BOOKS:

DETAILED COURSE OUTLINE

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<th>Week</th>
<th>Topic</th>
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|      | 1.1. Need and importance of accounting  
|      | 1.2. Accounting: a business language  
|      | 1.3. Book-keeping  
|      | 1.4. Book-keeping vs. accounting  
|      | 1.5. Branches of accounting  
|      | 1.6. Object of accounting  
|      | 1.7. Important accounting terms and concepts |
| 2    | 2. Transaction and accounting equation  
|      | 2.1. What is event?  
|      | 2.2. Features  
|      | 2.3. Classification  
|      | 2.4. Rules for cash and credit transactions  
|      | 2.5. The accounting equation  
|      | 2.6. Effect of business transaction upon the accounting equation  
|      | 2.7. Setting up new business |
| 3   | 3. Analysis of business transaction and double entry system  
|     | 3.1. Analysis of transaction  
|     | 3.2. Double entry system  
|     | 3.3. Advantage of double entry system  
|     | 3.4. Single entry system  
|     | 3.5. Distinction between double and single entry system  
|     | 3.6. What is an account?  
|     | 3.7. Classification of accounts  
|     | 3.8. Rules for debiting and crediting  
|     | 3.9. Explanation of rules  
| 4   | 4. Completing the Accounting Cycle  
|     | 4.1. Journal first phases of accounting cycle  
|     | 4.2. Definition  
|     | 4.3. Characteristic  
|     | 4.4. Narration  
|     | 4.5. Advantages of journal  
|     | 4.6. Simple entry & compound entry  
|     | 4.7. What is ledger  
|     | 4.8. Features  
|     | 4.9. Form of ledger accounts  
|     | 4.10. Posting procedure  
|     | 4.11. Balancing an account  
|     | 4.12. Normal balances  
|     | 4.13. Posting procedures  
|     | 4.15. Trial balance  
|     | 4.16. Method of preparing trial balancing  
|     | 4.17. Accounting cycle to the trial balance  
| 5   | 5. Final accounts: The completion of accounting cycle  
|     | 5.1. What are final accounts?  
|     | 5.2. What is revenue?  
|     | 5.3. Expenses  
|     | 5.4. Matching revenue and expenses  
| 6   | 6. Accounting for Merchandising Operations  
|     | 6.1. What is merchandising?  
|     | 6.2. What is merchandising operation  
|     | 6.3. Merchandising account  
|     | 6.4. Why is Merchandising account prepared  
|     | 6.5. Valuation of closing stock  
|     | 6.6. Closing entries  
|     | 6.7. Cost of goods sold  
|     | 6.8. Income statement  
|     | 6.9. Balance sheet  
<p>|     | 6.10. Classification of assets |</p>
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| 12 | 11. Plant Assets, Natural Resources and Intangibles  
11.1. Definition of depreciation  
11.2. Causes of depreciation  
11.3. Need for provision of depreciation  
11.4. Depreciation vs. fluctuation  
11.5. Characteristic of depreciation  
11.6. Method of charging depreciation  
11.7. Methods of depreciation accounting  
11.8. Distinction between fixed installment and reducing installment method |
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| 13 | 12. Liabilities for organization  
12.1. The nature of liabilities  
12.2. Account payable  
12.3. Notes payables  
12.4. Notes payable with interest charges |
| 14 | 13. Accounts for corporation  
13.1. Definition of corporation  
13.2. Characteristics  
13.3. Kinds of corporation  
13.4. Formation of public ltd company  
13.5. Important legal documents  
13.6. Stock capital  
13.7. Issuance of stock  
13.8. Accounting for stock  
13.9. Debenture and its kinds  
13.10. Issue of debenture  
13.11. Accounting for debentures |
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14.2. Classification of cash flow  
14.3. Preparation of cash flow statement  
14.4. Cash flow from Operating activities  
14.5. Cash flow from financing activities  
14.6. Cash flow from investing activities  
14.7. Relation between the statement of cash flows and the balance sheet |
| 16 | Presentations |
| 17 | Preparation Week |
| 18 | Final Examination |
## Digital Logic Design

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<td><strong>Code</strong></td>
<td>SE – 151</td>
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<td><strong>Credit hours</strong></td>
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<tr>
<td><strong>Prerequisite</strong></td>
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<tr>
<td><strong>Course Description</strong></td>
<td>This course is a detailed study and design course in the world of Digital systems. It familiarize the student with fundamental principles of digital systems operations and design.</td>
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### Objectives

- Understand the basic terminologies and operations of the digital circuits
- Understand the basic arithmetic operations performed by the digital systems using different number systems
- Define the basic Logic gates and their functionalities with their electronic circuits
- Use of Basic gates logics to develop advanced combinational circuits
- Understand the design procedure involved in the designing of advanced combinational circuits
- Understanding the operations of some basic digital sub systems
- Familiarize with sequential circuits basic
- Understanding the operations of sequential circuits building blocks used to develop advanced sequential memory elements
- Understanding the operations and application of counters, registers and memories in the digital systems

### Text Book

Digital Fundamentals by Floyd & Jain, 8th Edition

### Reference Books

Digital Design by M. Morris Mano, 5th Edition

### Course Coordinators

Irfan Qaiser

The following is a tentative weekly breakdown for this course. This is subject to future modifications. The references within parenthesis is to reference section of the textbook Digital Fundamentals by Floyd & Jain, 8th Edition)
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<th>TOPICS</th>
<th>Source (Book-Chapter No)</th>
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PAKISTAN STUDIES

Course Title: Pakistan Studies (Compulsory)

Course Code: PKS-101

Credit Hours: 2

Course contents:

1. Historical Perspective
   b. Factors leading to Muslim separatism
   c. People and Land
      i. Indus Civilization
      ii. Muslim advent
      iii. Location and geo-physical features.

1. Government and Politics in Pakistan
   Political and constitutional phases:
   - 1947-58
   - 1958-71
   - 1971-77
   - 1977-88
   - 1988-99
   - 1999-onwards

3. Contemporary Pakistan
   a. Economic institutions and issues
   b. Society and social structure
   c. Ethnicity
   d. Foreign policy of Pakistan and challenges
   e. Futuristic outlook of Pakistan

Recommended Books:

PHY-107 Basic Electronics

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Course Type:</td>
<td>Compulsory</td>
</tr>
<tr>
<td>(Compulsory/Core/Elective)</td>
<td></td>
</tr>
<tr>
<td>Lectures</td>
<td>32 sessions of 90 minutes each</td>
</tr>
<tr>
<td>Quizzes, Assignments and Presentation Schedule (tentative)</td>
<td>5 Quiz / Semester 5 Assignments / Semester 1 Presentation or Project / Semester</td>
</tr>
</tbody>
</table>

**Lecture Plan**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction to Electronics, Examples of Electronic Systems, Electronics versus Microelectronics, Analog and Digital Signals, Basic Circuit Theorems</td>
</tr>
<tr>
<td>2</td>
<td>Basic physics of semiconductors, Band Theory, Semiconductor Materials and Their Properties, PN Junction. Intrinsic and Extrinsic Semiconductor Material,</td>
</tr>
<tr>
<td>3</td>
<td>I/V Characteristics, p-n junction as aDiode, p-n junction forward bias, and p-n junction reverse bias. Quiz # 01</td>
</tr>
<tr>
<td>4</td>
<td>Reverse Breakdown, Zener breakdown, Avalanche Breakdown.</td>
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<tr>
<td>5</td>
<td>Diode Models and Circuits, Ideal Diode, Practical Diode Characteristics, Zener Diode. Assignment # 01</td>
</tr>
<tr>
<td>6</td>
<td>Applications of Diodes, Half-Wave and Full-Wave Rectifiers, Voltage Regulation. Quiz # 2</td>
</tr>
<tr>
<td>7</td>
<td>Limiting Circuits Applications, Clipper and Clamper circuits, LED and LCD (Diode Applications)</td>
</tr>
<tr>
<td>8</td>
<td>Physics of bipolar transistors, Structure of Bipolar Transistor, Operation of Bipolar Transistor in Active Mode. Assignment # 02</td>
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MID TERM EXAM

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<tbody>
<tr>
<td>9</td>
<td>Bipolar Transistor Models and Characteristics, Operation of Bipolar Transistor in Saturation Mode</td>
</tr>
<tr>
<td>10</td>
<td>The PNP Transistor, Structure and Operation. <strong>Assignment # 3</strong></td>
</tr>
<tr>
<td>11</td>
<td>BJT as a switch, cutoff and saturation Region of operation of BJT, BJT Amplifiers. <strong>Quiz # 3</strong></td>
</tr>
<tr>
<td>12</td>
<td>Bipolar Amplifier Topologies, Q-Point Analysis. Power Amplifiers.</td>
</tr>
<tr>
<td>13</td>
<td>Physics of MOS Transistors, Structure of MOSFET, Operation of MOSFET. <strong>Assignment # 4</strong></td>
</tr>
<tr>
<td>14</td>
<td>PMOS Transistor, CMOS Technology, Comparison of Bipolar and MOS Devices. <strong>Quiz # 4</strong></td>
</tr>
<tr>
<td>15</td>
<td>Introduction to A/D and D/A conversion circuits.</td>
</tr>
<tr>
<td>16</td>
<td>CMOS Amplifiers, CMOS Inverter Circuits.</td>
</tr>
</tbody>
</table>

FINALE PAPER

STAT-205 Probability and Statistics

Course Objective

Main objective of this course is that the Student will be able

1. To understand the basic concepts of statistics
2. To use the statistics in their field of study at basic level

Course contents


Books Recommended


### Complete Course Outline

<table>
<thead>
<tr>
<th>Course Code: STAT-205</th>
<th>Course Title: Probability and Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit Hours: 3</td>
<td>Semester: Spring-2016</td>
</tr>
<tr>
<td>Instructor's Name: Mirza Rizwan Sajid</td>
<td>Office (Room No): S-211</td>
</tr>
<tr>
<td>E-mail: <a href="mailto:mirzarizwansajid@gmail.com">mirzarizwansajid@gmail.com</a></td>
<td>Office Hours:</td>
</tr>
</tbody>
</table>

**Course Description**

Introduction of Statistics with real life examples; Organization of the Data; Frequency Distribution for Discrete and Continuous Data, Presentation of the Data; Charts and Graph for Discrete & Continuous Data respectively; Representation of Data; Measure of Central Tendencies, Measure of Dispersion; Standard Deviation & its Relative Measure, Measure of Shape; Skewness and Kurtosis; Basic Probability Theory, Random Variable, Introduction of Probability distributions, Discrete Probability Distribution: Binomial, Hyper Geometric and Poisson Distribution. Continuous Probability Distribution: Normal Distribution. Regression and Correlation Analysis.

**Course Type:** Compulsory

**Pre-requisites:** Basic knowledge of mathematics

**Goals**

Student will be able

3. To understand the basic concepts of Probability & Statistics
4. To use Probab

**Text Books**


**Additional Readings**


<table>
<thead>
<tr>
<th>Lectures</th>
<th>32 sessions of 90 minutes each</th>
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<tbody>
<tr>
<td>Attendance Policy</td>
<td>A minimum of 70% attendance is required for a student to be eligible to take the final examination. The students with less than 70% of the attendance in a course shall be given the grade SA (Short Attendance) in such a course and shall not be allowed to take its End Term Exams and will have to reappear in the course to get the required attendance to be eligible to sit in the exam when the course is offered the next time.</td>
</tr>
<tr>
<td>Grading</td>
<td>The course will be evaluated on the basis of the following percentage:</td>
</tr>
<tr>
<td></td>
<td>• Mid Term 25%</td>
</tr>
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<td>• Sessional work 25%</td>
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<tr>
<td></td>
<td>○ Presentation/Practical 10%</td>
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<tr>
<td></td>
<td>○ Assignment/Practical 10%</td>
</tr>
<tr>
<td></td>
<td>○ Quizzes 05%</td>
</tr>
<tr>
<td></td>
<td>• Final term 50%</td>
</tr>
<tr>
<td>Quizzes, Assignments and Presentation Schedule (tentative)</td>
<td>• A mini thesis will be required against quizzes and assignments.</td>
</tr>
<tr>
<td></td>
<td>• Presentation of mini thesis will be taken according to given schedule</td>
</tr>
</tbody>
</table>