

Research Methodology

MIE 115

Semester: First

Credit Hours: 3

Full Marks: 75

Internal: 30

Final Exam: 45

General Objectives:

General objectives are to:

- State and explain the concept of research methods which can be applied to any research studies.
- Develop an important dimension involving to research that of research methodology.

Specific objectives:

Specific objectives of this unit are:

- To provide knowledge to the students about different type of research, their process and applications.
- To familiarize the students with different types of data collection techniques and their applications.
- To develop an understanding of ethical issues and required consideration for their research studies.
- To provide skill for the selection of sampling technique, errors and proper planning different sampling methods.
- To enable the research students in developing the most appropriate methodology for their research study.

Course Contents

Unit 1: Introduction

4 hrs.

Meaning and importance of research; Classification of research; Research in Engineering Function, The Research Process; Research as a Scientific Process, Issues Governing Research Function; Listing and Description of Steps of Research.

Unit 2: Research Design

4. hrs.

Meaning, and Importance of Research Design; Classification of Research Design, The Research Process, Variables; Hypothesis; Errors Affecting Research Design; Measurements and Scaling, Reliability and validity, test of Research, Pilot Test, Field Study, Issues Governing Research Design.

Unit 3: Development of Research

9 hrs.

Selection of Research topics, Research Problem vs Research Question, Meaning and Importance of Research Proposal, Classification of Research Proposals, Components of a Research Proposal, Manager-Researcher Contribution in Developing a Research Proposal, Evaluation a Research Proposal, The Development of Research Issues Governing Proposal.

Unit 4: Sampling Designs

4. hrs.

Sampling vs Census, Sampling Techniques, Issues Governing Sampling Decisions.

Unit 5: Data Collection Methods

8 hrs.

Meaning, Importance, and Types of Data; Methods of Data Collection, Steps of Data Processing and Presentation, Various Methods of Data Collection.

Unit 6: Data Reduction and Analysis

5 hrs.

Meaning and Importance of Data Reduction; Data Reduction Process; Selected Techniques of Data Analysis;

Unit 7: Formatting the Report

4 hrs.

Formatting a Report; Developing the Final Draft; Preparing for Citation and Referencing; Making an Oral Presentation of a Report

Unit 8: Development of Research Proposal

3 hrs.

Meaning and Importance of research proposal ; the Development of Research Issues Governing Proposal; Writing a research report- Developing an outline; Key elements of research proposal- Objective, Introduction, Design or Rationale of work, Experimental Methods, Procedures, Measurements, Results, Discussion, Conclusion, Referencing and various formats for reference writing of books and research papers; Publications in Research journals

Unit 9: Socio-Ethical Issues in Research

4 hrs.

Issues governing Research Function; Incorporating Socio-Ethical Issues in Research; Impact of Social Issues in Research.

Reference Books:

1. Cooper & Schindler (2004). Business Research Methods. New Delhi: Tata McGraw-Hill Publishing Co
2. Best, John W, Research in Education, Prentice Hall of India, New Delhi
3. Wolf Howard K & P. R Pant, Social Science Research & Thesis Writing Research Division Kirtipur
4. Good William J & Paul K. Hatt, Methods in Social Research, McGraw Hill Kogakusha Ltd.
5. Kothari, C.R. Research Methodology 2nd Revised Edition, New International Publisher.

Software Engineering

MISE 111

Full Marks: 40+60
Pass Marks: 20+30

Credit: 4

Course Objectives:

- This course aims to give students both a theoretical and a practical foundation in software engineering including current and emerging software engineering practices and support tools.
- In the practical part, students will become familiar with the development of software products from an industry perspective.

Unit 1: Introduction

8 Hrs

- Introduction to software engineering
- Software processes
- Agile software development
- Project management

Unit 2: Software requirements

8 Hrs

- Requirements engineering processes
- System modeling
- Software prototyping
- Formal specification

Unit 3: Software Design

10 Hrs

- Architectural design
- Distributed systems architectures
- Object-oriented design
- Real time software design
- Design with reuse
- User interface design

Unit 4: Advanced Software Engineering

10 Hrs

- Software reuse
- Components -based software engineering
- Distributed software engineering
- Embedded software

Unit 5: Verification and Validation

10 Hrs

- Verification and validation planning
- Software inspections
- Clean room software development
- Defect Testing

- Integrating Testing
- Object –Oriented testing
- Testing workbenches
- Critical system validation

Unit 6: Software Quality and Quality Assurance

8 hrs

- Software cost estimation
- Software Quality assurance planning
- Software quality assurance process
- Software quality attributes
- Guidelines and checklists
- Software safety

Unit 7: Evolution

6 hrs

- Software Change
- Software re-engineering
- Configuration management

References:

1. Software Engineering, “ Ian Sommerville”, ninth edition
2. Software Engineering Fundamentals, “ Ali Behforooz and Frederick J. Hudson
3. Software Engineering: A Practitioner’s Approach, “Roger S. Pressman

Communication System Engineering

MISE 113

Semester: I

Credit Hour: 4

Full Marks: 100

Nature of Course: Theory

General Objective:

To make students familiarize with the detailed concept of communication system engineering so that they will be able to analyze and design such systems.

Specific Objectives

- To understand the key theoretical concepts in communications system engineering,
- To be familiar with the working of the various types of commonly used communication systems
- To be able to design some of the communication systems

COURSE CONTENTS

Unit 1: Theoretical Concepts in Communications Systems Engineering **25 Hrs**

- 1.1 Elements of a generic communications system/digital communication system and various issues associated with each element.
- 1.2 Comparison between analog and digital communications systems
- 1.3 Nyquist sampling theorem for analog to digital conversion
- 1.4 Waveform Coding Techniques: PCM, DPCM, ADPCM, DM, ADM
- 1.5 Baseband Shaping for Data Transmission: Unipolar, Polar, Bipolar signals- NRZ, RZ, Manchester and AMI format
- 1.6 Analog Modulation Techniques-time domain and frequency domain analysis
- 1.7 Digital Modulation Techniques
- 1.8 Evaluation of System performance: SNR and BER
- 1.9 Information and Entropy, Source Coding theorem, Huffman coding
- 1.10 Shannon's Channel Capacity Theorem
- 1.11 Error-Control Coding: rationale for coding and types of codes, linear block codes, error detection and correction, convolutional codes
- 1.12 Multiplexing
- 1.13 Emerging Trends in Modulation, Error control coding and multiplexing

Unit 2 Communications Systems **20 Hrs**

- 2.1 Terrestrial Microwave and Satellite communication systems
- 2.2 Cellular Mobile Communication Systems; GSM, CDMA, WiMax
- 2.3 Optical Fiber Communication System

Unit 3 Designing a Communication System **15 Hrs**

- 3.1 Design of a terrestrial microwave system
- 3.2 Design of an optical fiber communications system
- 3.3 Design of a cellular communications network

Object Oriented System

MISE 112

Semester: First

Credit Hour: 4

Full Marks: 100

Nature of the course: Theory

General Objectives;

- * Visualize the concept of object oriented technology in designing the new system.
- * Conceptualize the importance UML, AUMML and other object oriented tools for developing or reengineering the system.

Specific Objectives;

Specific objectives of this course are;

- * to make the student realize the importance of object oriented methods,
- * to clarify the various object oriented tools
- * to familiarize the students with the techniques of developing new system using the various object oriented tools.
- * to involve the students in designing a project based on the object oriented concepts.

COURSE CONTENT

Unit 1 <i>Introduction</i>	5
1.1 Introducing the course	
1.2 General Concepts and need of object oriented system	
1.3 Defining complex system	
1.4 Various attributes of Complex system	
1.5 The general Concepts of OOA & OOD	
Unit 2 <i>Object Oriented Design</i>	10
2.1 Defining Object Oriented Design	
2.2 General characteristics of OOD	
2.3 Benefits of Object Model	
2.4 Detail concept of Class, Object, Inheritance, Polymorphism etc	
Unit 3 <i>UML</i>	10
3.1 Definitions and Concepts	
3.2 UML Diagrams	
3.2.1 Class & Object Diagram	
3.2.2 Use Case Modelling & Diagram	
3.2.3 Sequence Diagram	
3.2.4 State Diagram	
3.2.5 Package Diagram	
3.2.6 Activity Diagram	
3.2.7 Component Diagram	
3.2.8 Deployment Diagram	

Unit 4 *Domain Analysis* 10

- 4.1 Concepts & Definition
- 4.2 Domain Class Model
- 4.3 Finding Classes, Association
- 4.4 Keeping Right Class & Association
- 4.5 Finding Methods
- 4.6 Data Dictionary Preparation
- 4.7 Finding Attributes
- 4.8 Refining with Inheritance
- 4.9 Testing the Access Path
- 4.10 Iterating Class Model
- 4.11 Group class into Package
- 4.12 Application Analysis

Unit 5 *Agent UML* 5

- 5.1 Defining Agent
- 5.2 Agent Orientation
- 5.3 Agent Oriented Programming
- 5.4 Common feature of agents and its representation

Unit 6 *Object Oriented Metrics* 5

- 6.1 Internal quality of Design
- 6.2 Principles of Object Oriented Design
- 6.3 Software Quality
- 6.4 Metrics for Object oriented Systems

Unit 7 *Object Oriented System Development Life Cycle* 5

- 7.1 S/W Development Process
- 7.2 Building High Quality software
- 7.3 Approaches to System Testing
- 7.4 Verification & Validation
- 7.5 Object Oriented Approach for s/w development
- 7.6 Prototyping

Unit 8 *Project Design* 15

A detailed project design must be done using the above concepts

References

1. *Object Oriented System* by Grady Booch
2. *Object Oriented Systems Analysis and Design using UML* by Simon Bennett, Steve McRobb, Ray Farmer.
3. *Object Oriented Systems Analysis and Design* by JOEY F. George, Dinesh Batra, JEFFREY A. HOFFER

Information Security (Elective)

MISE 214

Semester: Third

Credit Hour: 4

Full Marks: 100

Nature of the course: Theory

General Objectives;

- Upon completion of this course, participants will have gained knowledge of information security concepts, basic components and applications.

Course Contents:

Unit 1 <i>Introduction to Information Security</i>	4
1.1 The History of Information Security	
1.2 What Is Information Security?	
1.3 Critical Characteristics of Information	
1.4 Information security concepts and practices (CIA and other practices)	
1.5 Balancing Security and Access	
Unit 2 <i>Malicious code and application attacks</i>	10
2.1 Malicious code	
2.2 Password attacks	
2.3 DOS Attack	
2.4 Application attacks	
2.5 Web application security	
2.6 Reconnaissance attack	
2.7 Masquerading attack	
Unit 3 <i>Cryptography and Key Management</i>	10
3.1 Basics of cryptography	
3.2 Symmetric Cryptography (DES, Triple DES, AES, Key distribution)	
3.3 Asymmetric cryptography	
3.3.1 Public and private keys	
3.3.2 RSA	
3.3.3 Elliptic curve	
3.3.3 Hash function	
3.3.4 Digital signatures	
3.3.5 PKI	
3.4 Applied cryptography	

Unit 4 <i>Authentication and Access Control</i>	8
4.1 Overview of access control	
4.2 Authentication and Authorization	
4.3 Identification and authentication techniques	
4.4 Access control techniques	
4.5 Access control methodologies, implementations and administration	
Unit 5 <i>Network Security</i>	8
5.1 LAN security	
5.2 Wireless security threats and mitigation	
5.3 Internet threats and security	
5.4 Remote access security management	
5.5 Network attack and countermeasures	
Unit 6 <i>Auditing and Monitoring</i>	6
6.1 Auditing	
6.2 Monitoring	
6.3 Penetration-testing techniques	
6.4 Inappropriate activities	
6.5 Indistinct threats and countermeasures	
Unit 7 <i>Legal, Ethical and Professional issues in Information Security</i>	6
7.1 Types of Law	
7.2 Relevant Laws (Computer Crime, IP, Licensing, Privacy)	
7.3 International Laws and Legal Bodies	
7.4 Ethical Concepts in Information Security	
7.5 Codes of Ethics, Certifications, and Professional Organizations	
Unit 8 <i>Disaster Recovery and Business Continuity</i>	8
8.1 Business continuity planning	
8.2 Business impact assessment	
8.3 BCP documentation	
8.4 Nature of disaster	
8.5 Disaster recovery planning	