# CURRICULUM OF MASTER OF ENGINEERING (IT)

# Title of degree program

Master of Engineering in Computer and Information Engineering

Degree plan:Figure 2.1 shows the flow chart of courses offered in M.E (IT) by department of Computer Systems Engineering.

**Information Technology**

**Second Semester**

**First Semester**

**Third Semester**

**Knowledge Discovery & Data Mining**

**Object Oriented Programming**

**Machine Learning**

**Mobile Application Development**

**Wireless Networks**

**Advanced Microprocessor Systems**

**Information Security**

**Fourth Semester**

**Thesis Project**

**Research Methodologies and Techniques**

**Data Communication and Networking**

**Web Technologies**

**IT Project Management**

**Human Computer Interaction**

Figure 2.1: Flow-chart of M.E(IT) Courses

The curriculum breakdown over four semesters is shown in Table 2.1

Table 2.1: Courses offered by Department of Computer Systems Engineering in M.E (IT)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sub No.** | **Course Code** | **Name of Subject** | | **Credit Hours** | | | | |
| **Credits** | | **Total** | | **Marks** |
| **First Semester** | | | | | | | | |
| 01 | IT 5101 | Object Oriented Programming | | 2+1 | | 3 | | 50 + 50 |
| 02 | IT 5103 | Data Communication and Networking | | 2+1 | | 3 | | 50 + 50 |
| 03 | IT 5105 | Advanced Microprocessor Systems | | 2+0 | | 2 | | 50 |
| 04 | IT 5107 | Information Security | | 2+0 | | 2 | | 50 |
| **Total** | | | |  | | **10** | | **300** |
| **Second Semester** | | | | | | | | |
| 05 | IT 5201 | Knowledge Discovery & Data Mining | | 2+1 | | 3 | | 50+50 |
| 06 | IT 5203 | Web Technologies | | 3+0 | | 3 | | 100 |
| 07 | IT 5205 | Wireless Networks | | 2+0 | | 2 | | 50 |
| 08 | IT 5207 | Human Computer Interaction | | 2+0 | | 2 | | 50 |
| 09 | IT 5209 | Research Methodology and Techniques | | 2+0 | | 2 | | 50 |
| **Total** | | | |  | | **12** | | **350** |
| **Third Semester** | | | | | | | | |
| 09 | IT 5301 | Machine Learning | 2 + 0 | | 2 | | 50 | |
| 10 | IT 5303 | Mobile Application Development | 2 + 0 | | 2 | | 50 | |
| 11 | IT 5305 | IT Project Management | 2 + 0 | | 2 | | 50 | |
| **Total** | | |  | | **6** | | **150** | |
| **Fourth Semester** | | | | | | | | |
| 11 |  | Thesis Project | 0+6 | | 6 | | - | |
| **Total** | | |  | | **06** | | **-** | |

**Total Credit Hours = 34**

**Total Course Marks = 700**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MEHRAN UNIVERSITY OF ENGINEERING &TECHNOLOGY, JAMSHORO**  **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | | | |
| Title of Subject: | | **Object Oriented Programming (IT 5101)** | |  |
| Discipline: | | M.E. in IT | | |
| Pre-requisites: | |  | | |
| Semester: | | First | | |
| Effective:  Assessment:  Credit Hours:  Minimum Contact Hours: | | 14 batch and onwards  Sessional: 10%, Mid Semester: 30%, Final Examination: 60%  2+1  28+42 | | |
| **Aims:** | | The aim of this course is to give students a detailed understanding of the design and analysis of object-oriented programs. | | |
| **Objectives:** | | After completion of this course, students should be able to:   * Demonstrate understanding of classes, constructors, objects * Develop methods using parameters and return values and convert data types using API methods and objects * Design OOP using scope, inheritance, and other design technique * Create an object-oriented application using Java packages, APIs. and interfaces, in conjunction with classes and objects | | |
| **Contents:** | | OOP Concepts and Introduction, Objects, Classes, Messages, OOP principles, Encapsulation, Inheritance, Polymorphism  Data types, Type conversion and casting, Conditional and iterative control statements, Arrays and strings, multidimensional arrays. Classes, methods, constructors, destructors, events, nested classes, modifiers, class objects and variables, Defining methods, Creating objects, Returning a value, Constructors, Method overloading, Interfaces, Generics, Delegates, Performance, Reflection, Serialization and threading, Inheritance, Using super, Multilevel hierarchy, Method overriding, Dynamic method dispatch, Abstract classes, Packages and interfaces, Implementing interfaces, Extending interfaces, Multiple interfaces, Exception handling, Multithreading, AWT and JAVA GUI, Graphics, Event handling, Layout managers, Menu bars, Dialog boxes | | |
| **Note:** | | Practical will be based on theory. | | |
| **Books Recommended** | | | | |
| 1. Horton I.; *Beginning Java 2*, Latest Edition, Wiley publications. 2. Holmes B.J.; Joyc D.J.; *Object-oriented programming with Java*, Latest Edition, Jones & Bartlett publications 3. *C# 2008 Programming*, Black Book, by Cogent Solutions, Latest Edition, Dreamtech Press. 4. Reynolds-Haertle R.A.; *OOP with Microsoft® Visual Basic® .NET and Microsoft Visual C#*, Latest Edition. | | | | |
| **Approval:** | Board of Studies | | Resolution No. 1.3 Dated: 03.03.2014 | |
|  | Advanced Studies & Research Board | | Resolution No. 127.86 Dated: 10.03.2014 | |
|  | Academic Council | | Resolution No. 83.17 Dated: 30.06.2014 | |

|  |  |  |  |
| --- | --- | --- | --- |
| **MEHRAN UNIVERSITY OF ENGINEERING &TECHNOLOGY, JAMSHORO**  **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | | |
| Title of Subject: | **Data Communication and Networking (IT 5103)** | |  |
| Discipline: | M.E. in IT | | |
| Pre-requisites: |  | | |
| Semester: | First | | |
| Effective:  Assessment:  Credit Hours:  Minimum Contact Hours: | 14 batch and onwards  Sessional: 10%, Mid semester: 30%, Final Examination: 60%  2+1  28+42 | | |
| **Aims:** | The aim of this course is to cover essentials of Data communications and Networking. | | |
| **Objectives:** | After completion of this course, students should be able to:   * Obtain Fourier Series representation of periodic signals. * Find Fourier Transform of a given non-periodic signal. * Understand various modulation techniques. * Be familiar with the multiplexing and multiple access techniques | | |
| **Contents:** | **Data Communication:** Introduction, Orthogonal Signals, Fourier Series Representation of signals, Fourier Transform and its applications, Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Modulation, Encoding Techniques, Amplitude Shift Keying, Frequency Shift keying, Phase Shift Keying, DSL, Multiplexing Techniques, Multiple Access Techniques.  **Networking:** Introduction, OSI Model, TCP/IP Model, Ethernet, Fast Ethernet, Giga Bit Ethernet, Wireless Networks. | | |
| **Note:** | Practical will be based on theory. | | |
| **Books Recommended** | | | |
| 1. Lathi B.P.; Analogue and Digital Communication, Latest Edition, 2. Forouzan B.A.; Data Communication and Networking, Latest Edition, McGraw Hill. 3. Stallings W.; Data and Computer Communication, Pearson Education. | | | |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 | |
|  | Advanced Studies and Research Board | Resolution No. 127.86 Dated: 10.03.2014 | |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| MEHRAN UNIVERSITY OF ENGINEERING ANDTECHNOLOGY, JAMSHORO **INSTITUE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | | | | |
| Title of Subject: | | | | Advanced Microprocessors Systems (IT 5105) | |
| Disciplines  Semester | | | | M.E. in Information TechnologyFirst | |
| Pre-requisites  Assessment  Effective  Credit Hours  Minimum Contact  Hours: | | | | Sessional: 10%, Mid Semester: 30%, Final Examination: 60%  14 batch and onwards  2+0  28+00 | |
| **Aims:** | | To enhance the knowledge of microprocessors and Design of Microprocessors based systems. | | | |
| **Objectives:** | | After completion of this course, the students should be able   * to understand evaluation of Microprocessors and Compatibility issues, including the contrast of software, hardware and interfacing. * to sense microprocessor power functionally in applications. * to analyze different microprocessors and their hardware architecture. * to design simple microprocessor-based applications. * to understand Embedded Systems. | | | |
| **Contents:** | **Microprocessor Evolution & Revolution:** Microprocessor Age, Survey of CISC & RISC Microprocessor, Comparison of 8, 16, 32, 64-bit Microprocessors | | | | |
|  | **The Microprocessor:** Data Sheet Description, Pin Diagram & Functions, General Architecture of Microprocessor | | | | |
|  | **Software Architecture of the 8086/8088 Microprocessor**  Introduction, Internal Architecture of the 8086/8088 Microprocessors, Programming Model of 8086/8088 Microprocessors, through Pentium 4 Microprocessor, Memory Address space Data organization Data types, Segment registers & Memory Segmentation. Dedicated and general use of memory, Generating a memory address, pointers | | | | |
|  | **Addressing Modes.**  Register addressing mode, Immediate addressing mode, Direct addressing mode, register indirect addressing mode, Based addressing mode  Register relative addressing mode, Base relative plus index addressing mode, scaled index addressing mode | | | | |
|  | **8086/8088 Hardware Specification**  Pin configuration, Pins function, clock generator (8284A), Bus Buffering & latching, Bus timing, Ready & the wait state, Bus controller (8288) | | | | |
|  | **Memory Interface:** Memory Devices, memory pin connection, Interfacing RAM&ROM with microprocessor, Address Decoding. | | | | |
|  | **Basic I/O Interface:** Introduction to I/O Interface, Isolated and Memory mapped I/O, I/O port address Decoding, Programmable I/O devices, The PPI (Programmable Peripheral Interface). | | | | |
|  | **Aspects of Microprocessor-based Applied Design:** Systems specification, Block Level System Design, Hardware Design, Software Design, Hardware & Software Integration. | | | | |
|  | **Interrupts:** The purpose of Interrupts, Interrupts Processing, Hardware Interrupts, Interrupts mechanism in different Microprocessors 8259A Programmable Interrupts Controller | | | | |
|  | **Direct Memory Access & DMA Controlled I/O:** Basic DMA operation, the 8237 DMA Controller, shared Bus operation & Multiprocessing, case study of DMA processed Printer Interface. | | | | |
|  | **Microprocessor based Application Design:** Case Studies | | | | |
|  | **Embedded System:** Introduction Microcontrollers, applications of embedded systems | | | | |
|  | **Microprocessor based Application Design:** Case studies | | | | |
|  | | |  | | |
| **Books Recommended:** | | | | | |
| 1. Barry B. Brey, “The Intel Microprocessors, Architecture, Programming And Interfacing. (latest addition)” 2. Dotty T.L., "Fundamental Principal of Microcomputer Architecture", Latest Edition, Matrix Publishers, Portland Oregon. 3. Bishop R.; "Basic microprocessors and The 6800", Latest Edition, Hayden Book Company. 4. Camp R.C.; T.A. Smay, C.J. Triska, "Microprocessors And The 6800", Latest Edition, Matrix Publishers In. 5. Thorne M.; "Programming The 8086/8-88 For the IBM PC and Compatibles", Latest Edition. 6. "Microprocessor Applications of MAT 385 ", Volume-II, Latest Edition, Feedback. | | | | | |
| **Approval:** | | | Board of Studies | | Resolution No. 1.3 Dated: 03.03.2014 |
|  | | | Advanced Studies and Research Board | | Resolution No. 127.86 Dated: 10.03.2014 |
|  | | | Academic Council | | Resolution No. 83.17 Dated: 30.06.2014 |

|  |  |  |
| --- | --- | --- |
| **MEHRAN UNIVERSITY OF ENGINEERING &TECHNOLOGY, JAMSHORO**  **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | |
| Title of Subject | Information Security (IT 5107) | |
| Disciplines | M.E. in Information Technology | |
| Pre-requisites |  | |
| Semester | First | |
| Effective | 14 batch and onwards | |
| Assessment: Sessional: 10%, Mid Semester: 30%, Final Examination: 60%  Credit Hours 2+0  Minimum Contact  Hours 28+00 | | |
| **Aims:** | Learning step-by-step processing of information security and cryptography and the problems associated with and solving such problem. | |
| **Objectives:** | After completion of this course, students should be able to:   * Understand the need of security policy * Implement encryption and cryptography * Compile, integrate, and appraise various methods of encrypting information * Measure and determine appropriate encryption standards and techniques to suit specific business. | |
| **Books Recommended** | | |
| * Stallings W.; Cryptography and Network Security, Latest Edition * Stewart, J.M.; , CompTIA Security Review Guide, Latest edition, Wiley. | | |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies and Research Board | Resolution No. 127.86 Dated: 10.03.2014 |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MEHRAN UNIVERSITY OF ENGINEERING ANDTECHNOLOGY, JAMSHORO **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | | | |
| Title of Subject: | | Knowledge Discovery & Data Mining (IT 5201) | | |
| Disciplines: | | M.E. in Information Technology | | |
| Pre-requisites: | |  | | |
| Assessment:  Semester: | | Sessional: 10%, Mid Semester: 30%, Final Examination: 60% *Second* | | |
| Effective:  Credit Hours: | | 14-Batch and onwards 2+1 | | |
| Minimum Contact Hours: | | 28+42 |  | |
| **Aims:** | | The course will enable students to understand fundamental concepts and working principle of algorithms of data mining. | | |
| **Objectives:** | | Upon successful completion of this course, the students should be able   * to understand the basic concepts and importance of data mining. * to be familiar with several classifiers. * to understand and use the Association and Clustering algorithms. | | |
| **Contents:** | | **Introduction:** Data mining, motivating challenges, data mining tasks  **Data:** Types of data, Data Quality, Issues related to data collection, Measures of similarity and dissimilarity  **Classification:** Basic concepts, Decision Tree, Evaluating performance of classifier, Rule-based classifier, Bayesian classifier, Artificial Neural Network (ANN), Support Vector Machine (SVM)  **Association Analysis:** Frequent itemset generation, Rule generation, Apriori algorithm, FP-growth algorithm, Evaluation of association rules  **Cluster Analysis:** Clustering, K-means algorithm, Hierarchical algorithm, DBScan algorithm, Cluster Evaluation | | |
| **Books Recommended:**   1. Schwartz M.; “Mobile Wireless Communications”, Latest Edition, Cambridge University Press. 2. Gow G.A.; Smith R.K.; “Mobile and Wireless Communication: An Introduction”, Latest Edition, Mc-Graw-Hill. 3. Rappaport T.S.; “Wireless Communications - Principles and Practice”, Latest Edition, Prentice Hall. 4. Roshan P.; Leary J.; “Wireless LAN Fundamentals”, Latest Edition, Cisco Systems Inc. | | | | |
| **Approval:** | Board of Studies | | | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies & Research Board | | | Resolution No. 127.86 Dated: 10.03.2014: |
|  | Academic Council | | | Resolution No. 83.17 Dated: 30.06.2014 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| MEHRAN UNIVERSITY OF ENGINEERING ANDTECHNOLOGY, JAMSHORO **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | | | |
| Title of Subject: | | Web Technologies (IT 5203) | | |
| Disciplines: | | M.E. in Information Technology | | |
| Pre-requisites: | |  | | |
| Assessment:  Semester: | | Sessional: 10%, Mid Semester: 30%, Final Examination: 60% *Second* | | |
| Effective:  Credit Hours: | | 14-Batch and onwards 3+0 | | |
| Minimum Contact Hours: | | 42+00 |  | |
| **Aims:** | | The aim of this course is to develop the necessary technical knowledge and skills to manage the content of large-scale web sites, distributed software system using service-oriented computing and cloud applications. | | |
| **Objectives:** | | After completion of this course, the students should be able to   * Define the fundamental ideas and standards underlying Web Service Technology. * Effectively use Search Engines and understand basic principles and techniques for search engine Optimization. * Define the fundamental principles for cloud applications. * Discuss concepts at the frontier of industrial practice and emerging standards. * develop business processes using the Workflow foundation. * Develop and deploy web services and cloud applications using appropriate Microsoft technologies. * Also focuses on Advanced PHP concepts and Laravel Framework along with Node.js. | | |
| **Contents:** | | **SEO Web Applications**: introduces students to the concepts, business applications and practices of Search Engine Optimization (SEO).  **Object Oriented PHP**: Object Oriented Programming with PHP – Classes, Properties, Methods, Constructor, Destructor, Inheritance.  **Advance PHP**: Web Scraping using cURL, Regular Expression, Mail function, Web Services & APIs  **Node.js:** Introduction to Node.js, Node Package Manager, REPL Terminal, Node.js Webserver – Server and Clients, creating a simple server, Rendering HTML, Rendering JSON Data, Routing.  **JavaScript:** Fundamentals of JavaScript Code, Reusing Code with Functions, Simple Accordion with JavaScript Targeting elements by ID Hiding & showing elements with JavaScript, Testing code in the JavaScript Console Getting & setting properties Using if statements Reshowing text hints in empty form fields, Dynamically Changing Content with Custom Objects Checking the functionality of the select menu Getting the chosen value Dynamically changing the state name value Dynamically changing the rest of the values, Exploring JavaScript Selectors Intro to JavaScript selectors Selecting multiple elements & elements without IDs Getting a specific list item Getting elements by class name Getting multiple items using querySelectorAll() Getting a single item using querySelector() Chaining selectors together Targeting elements by data attribute Photo Filter Website: User Friendly Navigation Setting up the selectors with data attributes Getting the selectors on load Toggling the filter buttons Refining the filter buttons. | | |
| **Books Recommended:**   1. Technologies, social media, and Society by Caroline Westerhof 2. Web Scraping with Python Collecting More Data from the Modern Web by Riyan Mitchell 3. JavaScript for Web Designers by Lara Hogan | | | | |
| **Approval:** | Board of Studies | | | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies & Research Board | | | Resolution No. 127.86 Dated: 10.03.2014: |
|  | Academic Council | | | Resolution No. 83.17 Dated: 30.06.2014 |

**MEHRAN UNIVERSITY OF ENGINEERING ANDTECHNOLOGY, JAMSHORO**

**INSTITUE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**

**DEPARTMENT OF COMPUTER SYSTEMS ENGINEERING**

|  |  |  |  |
| --- | --- | --- | --- |
| Title of Subject | **Wireless Networks (IT 5205)** | | |
| Disciplines | ME Information Technology | | |
| Pre-requisites |  | | |
| Assessment | 10% Sessional Marks, 30% Mid Semester, 60% Final Exam | | |
| Semester | Second | | |
| Effective | 2014 batch Onwards | | |
| Credit Hours: | 2+0 | | Minimum Contract Hours: 28+ 00 |
| **Aims:** | | This course will cover the fundamental aspects of wireless networks, with emphasis on current and next-generation wireless networks. Various aspects of wireless networking will be covered including: fundamentals of cellular communication, mobile radio propagation and multiple access techniques. The course will include Wireless Personal Area Networks, Wireless Local Area Networks, Wireless Metropolitan Area Networks standards, mobile ad-hoc networks, wireless sensor networks, vehicular ad hoc networks and routing in wireless and mobile networks. The goal of this course is to introduce the students to state-of-the-art wireless network protocols and architectures. | |
| **Objectives:** | | * Understand the architecture and applications of current and next generation wireless networks: Cellular, WLANs, WPANs, WMANs, WSNs, MANETs and VANETs. * Understand the key concepts of mobile radio propagation. | |

**Contents: Wireless Network Architectures:**

**Cellular networks: 2G, 2.5G, 3G, 4G.**

* Wireless Personal Area Networks: Bluetooth, ZigBee, Ultra Wideband.
* Wireless Local Area Networks: WiFi
* Wireless Metropolitan Area Networks: WiMAX
* Mobile Ad hoc Networks.
* Wireless Sensor Networks.
* Vehicular Ad hoc Networks.

**Mobile Radio Propagation**:

* Multi-path propagation
* Path loss
* Slow fading
* Fast fading

**Routing Protocols:**

* Ad hoc Networks
* Mobile Ad hoc Networks
* Vehicular Ad hoc Networks
* Wireless Sensor Networks

**Security Issues in Wireless Networks:**

* Vulnerabilities
* Threats
* Solutions

**Open Research Areas**

* Quality of Service
* Fault Tolerance
* Medium Access Control

|  |
| --- |
| **Recommended Books:** |

1. Garg V.; Wireless Communications, Latest Edition, Morgan Kaufmann.
2. Kumar D. and Jury; Wireless Networking, Latest Edition, Morgan Kaufmann 2008.

|  |  |  |
| --- | --- | --- |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies and Reseach Board | Resolution No. 127.86 Dated: 10.03.2014 |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 |

|  |  |  |
| --- | --- | --- |
| **MEHRAN UNIVERSITY OF ENGINEERING &TECHNOLOGY, JAMSHORO**  **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | |
| Title | Human Computer Interaction (ME IT 5207) | |
| Disciplines | M.E Information Technology | |
| Pre-requisites |  | |
| Semester | Second | |
| Effective | 14-Batch and onwards | |
| Assessment: Sessional: 10%, Mid Semester: 30%, Final Examination: 60%  Credit Hours 2+0  Minimum Contact 28+00  Hours: | | |
| **Aims:** | Learning interactive computer systems to be effective, efficient, easy, so that people and society may realize the benefits of computation-based devices. | |
| **Objectives:** | After completion of this course, students should be able to:   * Understand the human aspects of technical systems. * To get familiar with new field of Human–computer interaction | |
| **Contents:** | **FOUNDATIONS:**  **The human:** Introduction, Input–output channels, Design Focus: Getting noticed, Design Focus: Where’s the middle? Thinking: reasoning and problem solving, Emotion, Individual differences, Psychology and the design of interactive systems.  **The computer:** Introduction, Text entry devices, Design Focus: Numeric keypads, Positioning, pointing and drawing, Display devices, Design Focus: Hermes: a situated display, Devices for virtual reality and 3D interaction, Physical controls, sensors and special devices, Design Focus: Feeling the road. Design Focus: Smart-Its – making using sensors easy. Paper: printing and scanning. Design Focus: Readability of text. Memory, Processing and networks, Design Focus: The myth of the infinitely fast machine  **The interaction:** Introduction, Models of interaction, Design Focus: Video recorder, Frameworks and HCI, Ergonomics, Design Focus: Industrial interfaces, Interaction styles, Design Focus: Navigation in 3D and 2D, Elements of the WIMP interface, Design Focus: Learning toolbars, Interactivity, The context of the interaction, Design Focus: Half the picture? Experience, engagement and fun  **Paradigms:** Introduction, Paradigms for interaction  **DESIGN PROCESS:**  **Interaction design basics:**  Introduction, What is design? The process of design, User focus, Design Focus: Cultural probes, Scenarios, Navigation design, Design Focus: Beware the big button trap, Design Focus: Modes, Screen design and layout, Design Focus: Alignment and layout matter, Design Focus: Checking screen colors, Iteration, and prototyping  **HCI in the software process:** Introduction, The software life cycle, Usability engineering, Iterative design and prototyping, Design Focus: Prototyping in practice, Design rationale  **Design rules:** Introduction, Principles to support usability, Standards, Guidelines, Golden rules and heuristics, HCI patterns.  **Universal Design:** Introduction, Universal design principles, Multi-modal Interaction, Design Focus: Designing websites for screen readers, Design Focus: Choosing the right kind of speech, Design Focus: Apple Newton, Designing for diversity, Design Focus: Mathematics for the blind.  **User support:** Introduction, Requirements of user support, Approaches to user support, Adaptive help systems, Design Focus: It’s good to talk – help from real people, Designing user support systems.  **MODELS:**  **Models of the system:** Introduction, Standard formalisms, Interaction models, Continuous behavior  **Ubiquitous computing and augmented realities:** Introduction, Ubiquitous computing applications research, Design Focus: Ambient Wood – augmenting the physical, Design Focus: Classroom 2000/eClass – deploying and evaluating ubicomp, Design Focus: Shared experience, Virtual and augmented reality, Design Focus: Applications of augmented reality, Information and data visualization, Design Focus: Getting the size right.  **Hypertext, multimedia and the world wide web:** Introduction, Understanding hypertext, Finding things, Web technology and issues, Static web content, Dynamic web content. | |
| **Books Recommended** | | |
| 1. Dix A., Finlay J.; Human–Computer Interaction, Latest Edition, Prentice-Hall.  2. Sears A., Jacko J.A.; Human-Computer Interaction Handbook, Latest Edition, Taylor and Francis  Group.  3. Booth P.A.; An Introduction to Human Computer Interaction, Latest Edition, Lawrence Erlbaum  Associates Ltd. | | |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies and Research Board | Resolution No. 127.86 Dated: 10.03.2014 |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 |

|  |  |  |
| --- | --- | --- |
| **MEHRAN UNIVERSITY OF ENGINEERING &TECHNOLOGY, JAMSHORO**  **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | |
| Title of Subject | Research Methodology & Techniques (IT 5209) Marks: 50 + 00 | |
| Disciplines | M.E. Information Technology | |
| Pre-requisites |  | |
| Semester | Second | |
| Effective | 14-Batch and onwards | |
| Assessment: Sessional: 10%, Mid Semester: 30%, Final examination: 60%  Credit Hours 2+0 Minimum Contact Hours: 28+00 | | |
| **Aims:** | Learning step-by-step research methodologies and techniques for defining the research problems. | |
| **Objectives:** | After completion of this course, students should be able to:   * get a formal training which enables one to understand the new developments in one’s field in a better way * face the challenge in solving the unsolved problems * Complete the task of interpretation and the art of writing research reports | |
| **Contents:** | **Research Methodology: An Introduction:** Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers.  **Defining the Research Problem:** What is a Research Problem? Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.  **Research Design:** Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Developing a Research Plan  **Sampling Design:** Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample? Random Sample from an Infinite Universe, Complex Random Sampling Designs.  **Measurement and Scaling Techniques:** Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques.  **Methods of Data Collection:** Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection.  **Processing and Analysis of Data:** Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attributes, Other Measures.  **Sampling Fundamentals:** Need for Sampling, Some Fundamental Definitions, Important Sampling Distributions, Sampling Theory  Polymorphism.  **Interpretation and Report Writing:** Meaning of Interpretation, Why Interpretation? Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports  **The Computer: Its Role in Research:** Introduction, The Computer and Computer Technology, The Computer System, Important Characteristics, Computer Applications, Computers and Researcher. | |
| **Books Recommended** | | |
| 1. Kothari C.R; Research Methodology: Methods and Techniques, Latest Edition, New Age International Publishers. 2. Singh Y.K.; Bajpai R.B.; Research Methodology – Techniques and Trends, APH Publishing Corporation. 3. Walliman N.; Your Research Project: Designing and Planning Your Work, Latest Edition, SAGE Publications. | | |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies and Research Board | Resolution No. 127.86 Dated: 10.03.2014 |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 |

|  |  |  |
| --- | --- | --- |
| **MEHRAN UNIVERSITY OF ENGINEERING &TECHNOLOGY, JAMSHORO**  **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | |
| Title of Subject: | **Machine Learning (5301)** | |
| Discipline: | M.E. in IT | |
| Pre-requisites: |  | |
| Semester: | Third | |
| Effective:  Assessment:  Credit Hours:  Minimum Contact Hours: | 14 batch and onwards  Sessional: 10%, Mid semester: 30%, Final Examination: 60%  2+0  28+00 | |
| **Aims:** | The aim of this course is to give students a broad introduction to machine learning and enable them to use machine learning algorithms to solve real world problems. | |
| **Objectives:** | After completion of this course, students should be able to:   * Have sufficient understanding of machine learning algorithms. * Have sound knowledge of model selection, over fitting, classification, and regression. | |
| **Contents:** | Introduction: Basic concepts, definition of learning, learning paradigms.  **Instance Based Learning:** Definition of concept learning/binary classification, instance space, target function, training examples, unweighted and weighted k-nearest neighbour (KNN) rule, supervised learning for classification, regression, and structured output prediction.  **Decision Tree learning:** Hypothesis space, consistency, and version space. List-then-eliminate algorithm, classifying with a decision tree, TDIDT decision tree algorithm  **Prediction and Overfitting:** Training error, test error, prediction error, overfitting, Occam’s razor.  **Model Selection and Assessment:** Model selection, controlling overfitting  In decision trees, Train, validation, test split, model assessment.  **Linear Classifiers and Perceptrons:** Linear classification, Perceptron learning algorithm, Multilayer Perceptrons, Error Backpropagation learning algorithm.  **Support Vector Machines (SVM):** Hard margin and Soft margin SVM, SVM Kernels, classification and regression through SVMs.  Markov Models, Statistical Learning Theory, Clustering. | |
| **Books Recommended** | | |
| 1. Mitchell T.; Machine Learning, Latest edition, McGraw Hill 2. Murphy K.; Machine learning – a Probabilistic Perspective, Latest Edition, MIT Press. 3. Cristiani S-T; Introduction to Support Vector Machines, Latest Edition, Cambridge University Press. | | |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies and Research Board | Resolution No. 127.86 Dated: 10.03.2014 |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 |

**MEHRAN UNIVERSITY OF ENGINEERING ANDTECHNOLOGY, JAMSHORO**

**INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**

**DEPARTMENT OF COMPUTER SYSTEMS ENGINEERING**

|  |  |  |  |
| --- | --- | --- | --- |
| Title of Subject | **Mobile Application Development (IT 5303)** | | |
| Disciplines | M.E. in Information Technology | | |
| Pre-requisites |  | | |
| Assessment | 10% Sessional Marks, 30% Mid Term, 60% Final Exam | | |
| Semester | Third | | |
| Effective | 2014 batch and onwards | | |
| Credit Hours: | 2+0 | | Minimum Contract Hours: 28+ 0 |
| **Aims:** | | This course will introduce the existing mobile operating systems including: Android, Apple iOS, Windows Mobile, Blackberry, Symbian, Bada. The course will focus on application development on Android platform. The aim of the course is to familiarize with areas in app development including memory management; user interface design; user interface building; input methods; data handling; network techniques and URL loading. | |
| Objectives: | | * Understand the most widely used mobile Platforms. * To design applications on the Android platform. | |

**Contents: Introduction to Mobile Operating Systems**

* Android Operating System.
* Apple iOS.
* Windows Mobile.
* Blackberry.
* Symbian.
* Bada.

**Application Development Tools**

* Eclipse.
* Android SDK.
* Android Emulator.
* Java.

**Basic Android Application Development**

* Themes.
* Widgets.
* User Interface Customization.
* 2D Graphics.
* Saving/storing data.
* Cellular networks.

**Advanced Android Application Development**

* Services.
* Wake locks.
* Audio and video.
* SMS.
* Bluetooth.
* Networks.
* Wi-Fi.

|  |
| --- |
| Recommended Books: |

1. Ed Brunette; Hello, Android Introducing Google's Mobile Development Platform by Ed Brunette, Latest Edition, Pragmatic Programmers.
2. Bose R.; Li W.; Mobile Platforms and Development Environments, Latest Edition, Morgan and Claypool Publishers.

|  |  |  |
| --- | --- | --- |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies and Research Board | Resolution No. 127.86 Dated: 10.03.2014 |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 |

|  |  |  |
| --- | --- | --- |
| **MEHRAN UNIVERSITY OF ENGINEERING &TECHNOLOGY, JAMSHORO**  **INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES**  **DEPARTMENT OF COMPUTER SYSTEMS ENGINERING** | | |
| Title of Subject | IT Project Management (IT 5305) | |
| Disciplines | M.E in Information Technology | |
| Pre-requisites |  | |
| Semester | Third | |
| Effective | 14-Batch and onwards | |
| Assessment: Sessional: 10%, Mid Semester: 30%, Final Examination: 60%  Credit Hours 2+0 Minimum Contact Hours: 28+00 | | |
| **Aims:** | Providing both basic and some advanced exposure to ITPM, so as to enable the manager of tomorrow to successfully complete sophisticated projects within the constraints of capital, time, and other resources. | |
| **Objectives:** | After completion of this course, students should be able to:   * To understand the concepts of project definition, life cycle, and systems approach * To develop competency in project scooping, work definition, and work breakdown structure * To develop competent students in project costing, budgeting, and financial appraisal | |
| **Contents:** | Introduction to Project Management  The Project Management and Information Technology Context  The Project Management Process Groups: A Case Study  Project Integration Management  Project Scope Management  Project Time Management  Project Cost Management  Project Quality Management  Project Human Resource Management  Project Communications Management  Project Risk Management  Project Procurement Management | |
| **Books Recommended** | | |
| 1. Schwalbe K.; Information Technology Project Management, Latest Edition,  [Wadsworth Publishing Co Inc](http://www.bookdepository.com/publishers/Wadsworth-Publishing-Co-Inc). 2. Marchewka J.T.; Information Technology Project Management, Latest Edition, Wiley. | | |
| **Approval:** | Board of Studies | Resolution No. 1.3 Dated: 03.03.2014 |
|  | Advanced Studies and Research Board | Resolution No. 127.86 Dated: 10.03.2014 |
|  | Academic Council | Resolution No. 83.17 Dated: 30.06.2014 |