MEHRAN UNIVERSITY OF ENGINEERING AND TECHNOLOGY, JAMSHORO

Dated: 25.05.2006

Reference:-

Academic Council Resolution No. 64.13 passed in its 64th meeting held on 28th March, 2006.

NOTIFICATION

No. Ac-I (A & G)/-3260**of 2006.** With reference to above, it is notified for the information of all concerned that, the Vice Chancellor, Mehran University of Engineering and Technology, Jamshoro has been pleased to launch/Continue following Masters / MPhil programs under various Departments in block.

S#	Program	Start Date	S#	Program	Start Date
1	Electrical Power Engineering	1978	2	Civil Engineering	1980
3	Structural Engineering	1984	4	Chemical Engineering	1993
5	Manufacturing Engineering	1995	6	Metallurgy and Materials Engineering	1995
7	Environmental Engineering	1996	8	Petroleum Engineering	2001
9	Information Technology	2001	10	Communication Systems and Networks	2001
11	Software Engineering	2001	12	Industrial Engineering and Management	2004

This is issued with the approval of Vice Chancellor.

REGISTRAR

COPY TO ALL CONCERNED

ME Courses in Software Engineering (Batches - 20MESE and onwards)

Sub No.	Course Code	Name of Subject	Credit Hours		
			Credits	**Total**	**Marks**
First Semester					
01	SE601	Advanced Software Requirements Engineering	3+0	3	100
02	SE602	Research Methodology	2+0	2	50
03	SE603	Modern Computing Paradigm	3+0	3	100
04	SE604	Software Engineering Lab - I	0+1	1	50
		Total		**9**	**300**
Second Semester					
05	SE611	Data Mining Concepts & Techniques	3+0	3	100
06	SE612	Formal Methods in Software Engineering	3+0	3	100
07	SE613	Advanced Software System Architecture	3+0	3	100
08	SE614	Software Engineering Lab - II	0+1	1	50
		Total		**10**	**350**
Third Semester					
09	SE701	Software Quality & Testing	3+0	3	100
10	SE702	Semantic Based Software Engineering	2+0	2	50
11	SE703	Reliability Engineering	2+0	2	50
12	SE704	Software Engineering Lab - III	0+1	1	50
		Total		**8**	**250**
Fourth Semester					
13	SE799	Thesis / Project	0+6	6	-
		Total		**6**	

Total Credit Hours = 33
Total Course Marks = 900

Approvals:
Board of Studies: Res. No. 2 **Dated: 25-02-2018**
AS&RB: Res. No. 154.17(a) **Dated: 04-12-2018**
Academic Council Res. No.94.4 **Dated: 27-03-2019**

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	Advanced Software Requirements Engineering
Code	**:**	SE601
Discipline	**:**	Software Engineering (1st Semester)
Effective	**:**	20 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	3+ 0 **Marks :** 100 + 00
Minimum Contact Hours:		42

Specific Objectives of course:

- To describe the requirements engineering process
- To effectively analyze software requirements for the development of cost-effective and efficient technical solutions.
- To document effective requirements in Software Requirements Specification (SRS) using clear, unambiguous requirements.

Course outline:

- Software Requirements Fundamentals: Product and process requirements, Functional and non-functional requirements, Emergent properties, Quantifiable requirements, System and software requirements. Requirements Process: Process models, Process actors, Process support and management, Process quality and improvement.
- Requirements Analysis: Requirements sources, Elicitation techniques. Requirements Analysis: Requirements classification, Conceptual modeling, Architectural design and requirements allocation, Requirements negotiation, Formal analysis.
- Requirements Specification: System definition document, System requirements document, Software requirements specification.
- Requirements Validation: Requirements reviews, Prototyping, Model validation, Acceptance tests.
- Practical Considerations: Iterative nature of the requirements process, Change management, Requirements attributes, Requirements tracing, Measuring requirements. Software Requirements Tools. Current research topics in requirement engineering.

BOOKS RECOMMENDED

1. Software Engineering: A Practitioner's Approach, Roger S. Pressman, Bruce R. Maxim, 8th Ed, McGraw-Hill Education, 2015.
2. Object-Oriented Analysis, Design and Implementation, Brahma Dathan, Sarnath Ramnath, 2nd Ed, Universities Press, India, 2014.
3. Software Modeling and Design: UML, Use Cases, Patterns, and Software Architectures, Hassan Gomaa, Cambridge University Press, 2011.
4. Applying UML & Patterns: An Introduction to Object-Oriented Analysis & Design and Iterative Development, Craig Larmen, 3rd Edition.
5. Head First Design Patterns, Eric Freeman, Elisabeth Freeman, Kathy Sierra and Bert Bates, O'Reilly Media, Inc., 2004.

Approval:

Board of Studies:	Res.No.02	Dated:25-09-2018
AS&RB:	Res.No. 154.17(a)	Dated:04-12-2018
Academic Council:	Res.No.94.4	Dated:27-03-2019

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**MODERN COMPUTING PARADIGMS**
Code	**:**	SE603
Discipline	**:**	Software Engineering (1st Semester)
Effective	**:**	14 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	3+0 **Marks :** 100+00
Minimum Contact Hours:		42

Specific Objectives of course:

- To cover various aspects of modern computing paradigms including cluster management, resource sharing, resource scheduling, concepts about cloud computing etc.

Course outline:

- Theory of Computing paradigms, Parallel and Cluster Computing: The system and programming Models. MPI and the parallel Computing.
- Virtual organizations and Grid Computing Evolutions, Architecture, Applications. Grid computing tools/middleware/different kernels etc. Protocols/components/interfaces etc of the middleware.
- Computational and data intensive Grids. Trust management in Grids. Grid to Cloud Computing: Utility Computing
- Virtualization of Resources Clouds and virtualization system architecture. Grids Vs Clouds. Clouds are Grids?
- Cloud middleware and models. Web Services and the Clouds.
- Self-adaptive service or application design.
- Recent developments and future directions of the Computing

BOOKS RECOMMENDED

1. Market-Oriented Grid and Utility Computing" by **Buyya**, **Rajkumar**
2. Fundamentals of Grid Computing IBM" **by Ian Foster,Bertis viktors**
3. The grid: blueprint for a new computing infrastructure"**. by Ian Foster**

Approval:

Board of Studies:	Res.No.02	Dated:13-02-2014
AS&RB:	Res.No. 127.85	Dated: 10-03-2014
Academic Council:	Res.No. 83.20	Dated: 30-05-2014

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**RESEARCH METHODOLOGY**
Code	**:**	SE602
Discipline	**:**	Software Engineering (1st Semester)
Effective	**:**	19 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	2+0 **Marks :** 50 + 0
Minimum Contact Hours:		28

Specific Objectives of course:

- To identify problems and formulate problem statement.
- To design hypothesis and conduct quantitative and qualitative research methods
- To conduct case studies for research goals

Course outline:

- Introduction to Research. Objectives of Research. Importance of Research Methodology in Research Study.
- Types of Research. Steps in Conducting Research. What is Literature Review? Why need for Literature Review. Types of Literature Review. Systematic Literature Review Protocol.
- Problem Statement and Problem formulation. Criteria for selecting a problem. Identifying Types of variables in Research.
- Types of hypothesis. Identifying Target Population. Types of Sampling. Sampling Techniques. Quantitative Research Methods.
- Scientific Methods. Design of Quantitative Surveys. Techniques to Conduct Quantitative Methods. Introduction to Qualitative Research. Qualitative Research Methods.
- Data Analysis and Theory in Qualitative Research Articles. Introduction to Mixed Methods Research. Design of Mixed Methods Research. Evaluation of Mixed Methods Research.
- Case Study. How to Conduct a Case Study. Case Study Protocol. Importance and Benefits of Case Study. Types of Statistical Tests to Conduct Data Analysis. Data Analysis Tools.
- Introduction to SPSS. Hands on Practice of SPSS. How to Define variables in SPSS. How to Record Collected Data in SPSS. Types of Tests via SPSS including Regression. Correlation.
- Cross tabulation and others. How to write Good Research Proposal. Contents of Thesis. Important Elements of Research Thesis.

BOOKS RECOMMENDED

1. Research design: Qualitative, quantitative and mixed methods approaches, Creswell, J. W. Thousand Oaks, CA: Sage,[Latest Edition].

Approval:

Board of Studies:	Res.No.02	Dated:25-09-2018
AS&RB:	Res.No.154.17(a)	Dated:04-12-2018
Academic Council:	Res.No.94.4	Dated:27-03-2019

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**Advanced Software System Architecture**
Code	**:**	SE613
Discipline	**:**	Software Engineering (2nd Semester)
Effective	**:**	19 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	3+0 **Marks :** 100 + 00
Minimum Contact Hours:		42

Specific Objectives of course:

- Course develops an in-depth understanding of software system organization. It considers qualitative and quantitative architecture assessment and mapping of system models with software architecture.

Course outline:

- Quality attributes in the context of architecting.
- Qualitative and quantitative assessment of architectures. Architectural modeling through Architecture Description Languages.
- System modeling its relation to software architecting. Architecting for evolution and variability.
- Selecting and applying design patterns in architectural process.
- Partitioned and layered architectures. System-of-Systems and Ultra-Large Scale Systems. Software Product Lines and Configurable Software. Self-Adaptive Software.
- Architectural Description Languages. Feature Modeling. Architecture and Model-Based Testing.
- Architectures of modern software systems, such as SOA, Webservices, Microservices, and cloud-based systems
- Current research topics in software system architecture.

BOOKS RECOMMENDED

1. Designing Software Architectures: A Practical Approach (SEI Series in Software Engineering), Humberto Cervantes, Rick Kazman, [Latest Edition], Addison-Wesley Professional.
2. Software Product Lines: Practices and Patterns, P. Clements and L. Northrup, Addison-Wesley, 2002.
3. Software Architecture : Foundations, Theory, and Practice, R. Taylor, N. Medvidović and E.M. Dashofy, John Wiley, 2010

Approval:

Board of Studies:	Res.No.02	Dated: 25-09-2018
AS&RB:	Res.No.154.17(a)	Dated:04-12-2018
Academic Council:	Res.No.94.4	Dated:27-03-2019

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**DATA MINING CONCEPTS & TECHNIQUES**
Code	**:**	SE611
Discipline	**:**	Software Engineering (1st Semester)
Effective	**:**	14 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	3+0 **Marks :** 100 + 00
Minimum Contact Hours:		42

Specific Objectives of course:

- This course on data mining will cover methodology, major software tools and applications in this field. By introducing principal ideas in statistical learning, the course will help students to understand conceptual underpinnings of methods in data mining. The focus will be on the breadth of data mining and its applications in information technology.

Course outline:

Introduction: Relational Databases, Data Warehouses, Transactional Databases, Introduction to Data Mining, Knowledge Discovery Process, Major Applications of Data Mining, Major Issues in Data Mining.

Data Preprocessing: Why Preprocess the Data, Descriptive Data Summarization, Major Tasks in Data Preprocessing (Data cleaning, integration and transformation), How to Handle Missing Data, How to Handle Noisy Data,Data reduction Methods, Discretization and Concept hierarchy for numeric data.

Mining Frequent Patterns, Association & correlations: Relationships & Patterns, Market basket analysis, Frequent Itemsets, Closed Itemsets and Association Rules, Frequent Pattern Mining,

Classification & Prediction: Data Mining Functionalities, Classification Schemes, Descriptive & Predictive Data Mining, Issues Regarding Classification and Prediction, Classification Methods.

Association Mining: Association Mining, Support & Confidence, Apriori Algorithm, Sampling Algorithm,Frequent-Pattern Tree Algorithm, Partition Algorithm.

Cluster Analysis: Introduction to clustering, Major clustering methods, Outlier Analysis

BOOKS RECOMMENDED

1. Jiawei Han, Micheline Kamber, and Jian Pei. Data Mining: Concepts and Techniques (Latest Edition.). Morgan Kaufmann Publishers Inc., San Francisco, CA, USA.
2. Thomas Connolly and Carolyn E. Begg. Database Systems: A Practical Approach to Design, Implementation and Management. (Latest Edition) Addison-Wesley Longman Publishing Co., Inc., Boston, MA, USA.
3. Pang-Ning Tan, Michael Steinbach, and Vipin Kumar. Introduction to Data Mining, (Latest Edition). Addison-Wesley Longman Publishing Co., Inc., Boston, MA, USA.

Approval:

Board of Studies:	Res.No.02	Dated:13-02-2014
AS&RB:	Res.No. 127.85	Dated: 10-03-2014
Academic Council:	Res.No. 83.20	Dated: 30-05-2014

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**FORMAL METHODS IN SOFTWARE ENGINEERING**
Code	**:**	SE612
Discipline	**:**	Software Engineering (2nd Semester)
Effective	**:**	20 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	3+0 **Marks :** 100 + 0
Minimum Contact Hours:		42

Specific Objectives of course:

- Course is intended to Describe the costs and benefits of formal methods', Construct formal models of sequential software systems, Implement sequential software systems based on formal models, Verify attributes of formal models, Demonstrate formal correctness of simple procedure

Course outline:

- Introduction to formal methods and specification. State-Based Formal Methods.
- Transformational systems. Traditional approaches. Z specification.
- Formal development cycle. Temporal Specification: reactive systems, syntax and semantics of temporal logic, temporal specification of reactive systems (safety, aliveness, fairness).
- Model Checking: Generating finite models, Analysis of a simple model checking algorithm. Symbolic model checking.
- Overview of reduction methods. Spin and Promela.
- Case study and practical verification of properties.
- Current research topics based on Formal Methods.

BOOKS RECOMMENDED

1. Z: An Introduction to Formal Methods by Antoni Diller, [Latest Edition], John Wiley & Sons, Inc.
2. Modern Formal Methods and Applications, Hossam A. Gabbar, Springer-Verlag [Latest Edition].
3. Formal Software Development: From VDM to Java, Charatan, Quentin, and Aaron Kans. Palgrave Macmillan, [Latest Edition].
4. Understanding Z: a Specification Language and its Formal Semantics. J. M. Spivey. [Latest Edition]. Cambridge University Press, New York, NY, USA.

Approval:

Board of Studies:	Res.No.02	Dated:25-09-2018
AS&RB:	Res.No. 154.17(a)	Dated: 04-12-2018
Academic Council:	Res.No. 94.4	Dated: 27-03-2019

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**Reliability Engineering**
Code	**:**	SE703
Discipline	**:**	Software Engineering (3rd Semester)
Effective	**:**	20 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	2+0 **Marks :** 50 + 00
Minimum Contact Hours:		28

Specific Objectives of course:

- To design safe and critical system software while considering different aspects of dependability and reliability.

Course outline:

- Introduction to Reliability Engineering. The Need for Reliable Software.
- Software Reliability Engineering Concepts. Basic Definitions. Software Reliability and System Reliability.
- The Dependability Concept. Reliability Modeling. Availability Modeling.
- Statistical Reliability Models for Software Reliability. Best Current Practices of software Reliability Engineering. Software Metrics for Reliability Assessment.
- Software Testing and Reliability. Software Reliability Tools. Review of Reliability Theory.
- Analytical Techniques and Basic Statistics for Reliability Engineering.
- Current research topics in Reliability Engineering.

BOOKS RECOMMENDED

1. An Introduction to Reliability and Maintainability Engineering, Ebeling, C. E., Waveland Press, Inc., latest edition.
2. IEEE Recommended Practice in Software Reliability Handbook of Software Reliability Engineering by Michael R. Lyu. Published by IEEE Computer Society Press and McGraw-Hill Book Company, latest edition.

Approval:

Board of Studies:	Res.No.02	Dated:25-09-2018
AS&RB:	Res.No.154.17(a)	Dated:04-12-2018
Academic Council:	Res.No.94.4	Dated:27-03-2019

Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**Semantic based Software Development**
Code	**:**	SE702
Discipline	**:**	Software Engineering (3rd Semester)
Effective	**:**	20 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	02+ 00 **Marks :** 50 + 00
Minimum Contact Hours:		28

Specific Objectives of course:

- The main areas of semantics, different ways to define meaning, the interface of semantics and pragmatics, ways of analysing and contrasting meanings, formal semantics using propositional logic, cognitive semantics, conceptual semantics, the interface of semantics and morphology, the interface of semantics and syntax, semantic change

Course outline:

XML
XML basics, XML Tree, XML Syntax, XML Elements, XML Attributes, XML Namespaces, XML Encoding, Viewing XML, XML and CSS

DTDs and XML SCHEMAS
XML Doctypes, XML Validator, Document Type Definition, XML Schema

Resource Description Framework
Introduction to RDF, RDF rules, examples of RDF, RDF Elements, RDF Containers, RDF Collections, RDF Schema, RDF Dublin Core, RDF OWL

Web Ontology Language
Ontology, OWL, OWL Sublanguages, OWL lite, OWL DL, OWL full

SPARQL
Structure of SPARQL query, SPARQL architecture, Datapoints, Friend of a Friend Ontology

SEMANTIC WEB SERVICES
Web Service Description Language, Web Ontology Language Schema, Semantic Annotation for Web Service Description Language

Advanced Topics
Semantic Opinion Mining,

BOOKS RECOMMENDED

1. Practical RDF by Shelly Powers. O'Reilly Media; latest edition
2. Programming the Semantic Web by Toby Segaran, Colin Evans and Jamie Taylor. O'Reilly Media; latest edition

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Mehran University of Engineering and Technology, Jamshoro
Department of Software Engineering

ORIGINAL SUBMITTED SYLLABUS

Title of Subject	**:**	**SOFTWARE QUALITY & TESTING**
Code	**:**	SE701
Discipline	**:**	Software Engineering (3rd Semester)
Effective	**:**	20 ME SE and onwards
Pre-requisite	**:**	None
Assessment	**:**	10% Sessional 30% Mid Semester 60% Final Semester Examination
Credit Hours	**:**	3+0 Marks : 100+00
Minimum Contact Hours:		42

Specific Objectives of course:

- To learn standards of quality models
- To learn deployment of various software testing techniques and methods

Course outline:

- **SOFTWARE QUALITY ASSURANCE**
  Quality, Quality Control, Quality Assurance, SQA, FTR, Statistical Quality Assurance, Software Reliability, SQA Plan, ISO Standards, Management Issues, The Reuse Process, Describing Reusable Components, Impact on Quality, Productivity and Cost
- **SOFTWARE TESTING TECHNIQUES**
  Software Testing Fundamentals, Testing Objectives, Testing Principles, Testability, WHITE-BOX Testing, Control Structure Testing, BLACK- BOX Testing
- **SOFTWARE TESTING STRATEGIES**
  A Software Testing Strategy, Criteria for Completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging Process
- **OBJECT-ORIENTED TESTING**
  Testing OO Analysis and OO Design Models, OO Testing Strategies, Testing Methods for the Classes, Inner Class Test Case Design
- **CLEAN ROOM SOFTWARE ENGINEERING**
  Clean Room Strategy, Design Refinements and Verification, Clean Room Testing
- **RE-ENGINEERING**
  Business Process Re- Engineering (BPR), Principles of BPR, BPR Model, Software Re-Engineering, Software Maintenance, Software Re-Engineering, Process Model, Forward and Reverse Engineering

BOOKS RECOMMENDED

1. Software Quality Assurance: Integrating Testing, Security, and Audit (Internal Audit and IT Audit), Abu Sayed Mahfuz, Auerbach Publications, [Latest Edition].
2. Software Quality Engineering, Testing, Quality Assurance, and Quantifiable improvements, Jeff Tian, IEEE Computer Society, [Latest Edition].
3. Introduction to Software Engineering, P Ammann and J Offutt, Cambridge University Press, [Latest Edition].
4. Software Engineering: A Practitioner's Approach, Roger S. Pressman, Bruce R. Maxim, [Latest Edition], McGraw-Hill Education.

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