M.E. (Software Engineering)

2015 Regulations, Curriculum & Syllabi

BANNARI AMMAN INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University, Chennai
Approved by AICTE - Accredited by NBA New Delhi, NAAC with 'A' Grade and ISO 9001:2008 Certified)
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PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

Quite a few years (3-5 years) after graduation, our graduates will,

I. Productively work in an academic institute/ software development team as member or leader.
II. Pursue research in reputed institutes in the relevant fields.
III. Possess professional ethics, life long learning / adaptability.

PROGRAM OUTCOMES (POs)

Upon successful completion of 2 years ME [SE] degree programme, the students will be able to:

a. Design solutions for complex IT related engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
b. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

b. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

c. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

d. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
f. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

e. g. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

f. h. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

g. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MAPPING OF PEO'S AND PO'S

PEO(s)	Programme Outcome (s)						
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
I	x	x	x			x	x
II	x	x	x	x	x	x	
III				x	x		x

M. E. Software Engineering (Full Time)

Minimum credits to be earned: 75

First Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE11	Applied Probability and Operations Research	II	b,c	3	2	0	4
15SE12	Software Engineering Methodologies	I,III	a,b,c,e,f	3	0	0	3
15SE13	Data Structures and Algorithms	I,III	a,b,c	3	0	0	3
15SE14	Database Systems	I,III	a,b,c	3	0	0	3
15SE15	Software Project Management	I, II, III	a,b,c,f	3	0	0	3
	Elective I			3	0	0	3
15SE17	Data Structures and Algorithms Laboratory	I,III	a,b,c	0	0	4	2
15SE18	Database Systems Laboratory	I,III	a,b,c	0	0	4	2
15GE19	Business English - I[α]	I, II, III	f,g,h,i	1	0	2	2
			Total	**19**	**2**	**10**	**25**
Second Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE21	Research Methodology	II	b,c	3	0	0	3
15SE22	Software Component Architecture	III	a,b,c	3	0	0	3
15SE23	Software Testing and Quality Assurance	I,III	f,g,h,i	3	0	0	3
15SE24	Operating Systems	II, III	a,b,c,d	3	0	2	4
	Elective II			3	0	0	3
	Elective III			3	0	0	3
15SE27	Software Component and Testing Laboratory	I,III	f,g,h,i	0	0	4	2
15SE28	Technical Seminar	I,II, III	d,f,g,h,i	0	0	2	1
15GE29	Business English - II[α]	I, II, III	f,g,h,i	1	0	0	1
			Total	**19**	**0**	**8**	**23**
Third Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
	Elective IV			3	0	0	3
	Elective V			3	0	0	3
	Elective VI			3	0	0	3
15SE34	Project Work - Phase I	I, II, III	f,g,h,i				6
			Total	**9**	**-**	**-**	**15**
Fourth Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE41	Project Work - Phase II	I, II, III	f,g,h,i				**12**

[α] Common to all M.E. / M.Tech. Programmes

M. E. Software Engineering (Part Time)

First Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE11	Applied Probability and Operations Research	II	b,c	3	2	0	4
15SE12	Software Engineering Methodologies	I,III	a,b,c,e,f	3	0	0	3
15SE13	Data Structures and Algorithms	I,III	a,b,c	3	0	0	3
15SE17	Data Structures and Algorithms Laboratory	I,III	a,b,c	0	0	4	2
15GE19	Business English - I[α]	I, II, III	f,g,h,i	1	0	2	2
			Total	**10**	**2**	**6**	**14**
Second Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE21	Research Methodology	II	b,c	3	0	0	3
15SE22	Software Component Architecture	III	a,b,c	3	0	0	3
15SE23	Software Testing and Quality Assurance	I,III	f,g,h,i	3	0	0	3
15SE27	Software Component and Testing Laboratory	I,III	f,g,h,i	0	0	4	2
15GE29	Business English - II[α]	I, II, III	f,g,h,i	1	0	0	1
			Total	**10**	**0**	**4**	**12**
Third Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE14	Database Systems	I,III	a,b,c	3	0	0	3
15SE15	Software Project Management	I, II, III	a,b,c,f	3	0	0	3
15SE24	Operating Systems	II, III	a,b,c,d	3	0	2	4
15SE18	Database Systems Laboratory	I,III	a,b,c	0	0	4	2
			Total	**9**	**0**	**6**	**12**
Fourth Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
	Elective I			3	0	0	3
	Elective II			3	0	0	3
	Elective III			3	0	0	3
15SE28	Technical Seminar	I,II, III	d,f,g,h,i	0	0	2	1
			Total	**9**	**0**	**2**	**10**
Fifth Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
	Elective IV			3	0	0	3
	Elective V			3	0	0	3
	Elective VI			3	0	0	3
15SE34	Project Work - Phase I	I, II, III	f,g,h,i		-	-	6
			Total	**9**	**0**	**0**	**15**
Sixth Semester							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE41	Project Work - Phase II	I, II, III	f,g,h,i	-			**12**

[α] Common to all M.E. / M.Tech. Programmes

List of Core Electives							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SE51	Cloud Computing	II	b,d	3	0	0	3
15SE52	Data Warehousing and Mining	II, III	a,b,c,d	3	0	0	3
15SE53	XML and Web Services	III	a,b,c	3	0	0	3
15SE54	Soft Computing	II	b,c,h,i	3	0	0	3
15SE55	Digital Image Processing	II, III	b,c,h,i	3	0	0	3
15SE56	Network Engineering	III	h,i	3	0	0	3
15SE57	Real Time Systems	I	a,b,d	3	0	0	3
15SE58	Open Source Software	II, III	e,h,i	3	0	0	3
15SE59	App Engine	II, III	e,h,i	3	0	0	3
15SE60	Mobile and Pervasive Computing	I, II	a,b,c	3	0	0	3
15SE61	Machine Learning Techniques	II	b,c	3	0	0	3
15SE62	Software Measurements and Metrics	I, III	a,b,c,f	3	0	0	3
15SE63	Software Maintenance and Administration	I, III	a,b,c,f	3	0	0	3
15SE64	Software Process Maturity Models	I, III	a,b,c,e	3	0	0	3
15SE65	Big Data Analytics	II, III	a,b,c,e,h	3	0	0	3
15SE66	Information Retrieval Techniques	II, III	a,b,c,e,h	3	0	0	3
15SE67	Bio-Informatics	II	b,c	3	0	0	3
15SE68	Information Security	II	b,c	3	0	0	3
15SE69	Java Programming	I,II, III	a,b,c,d,e	3	0	0	3
One Credit Courses							
Code No.	**Course**	**Objectives & Outcomes**		**L**	**T**	**P**	**C**
		PEOs	**POs**				
15SEXA	MAYA	I, III	c,f,h,i	-	-	-	1
15SEXB	Android Application Development	II, III	b,c,f,g,h,i	-	-	-	1

15SE11 APPLIED PROBABILITY AND OPERATIONS RESEARCH

3 2 0 4

Course Objectives

- To understand the basics of standard distributions and their significances
- To understand the applications of stochastic processes and queue models with simulation techniques
- To understand and master the optimization theory through different problem solving methods.

Course Outcomes (COs)

1. Understand the concepts of basics of standard distributions
2. Provide solution to the problems related to stochastic processes and queue models with simulation techniques
3. Relate the concepts to engineering applications.

Unit I

Probability and Random Variables

Probability concepts – Random Variables – Moment generating function – Standard distributions - Binomial - Poisson - Rectangular or Uniform – Normal - Exponential distributions - Functions of random variables - Two dimensional random variables.

9 Hours

Unit II

Stochastic Processes

Classification – Stationary and Random process – Markov process – Markov chains – Transition probability – Classification of Markov chain – Limiting distribution – First passage time – Poisson process – Birth and death process.

9 Hours

Unit III

Queueing Models

Characteristics of Queueing Models- Kendal's Notation-Single and Multi-Server Markovian queuing models M/M/1, M/M/C (finite and infinite capacity) and (M/G/1) :(∞/GD) - Queuing applications.

9 Hours

Unit IV

Simulation and Applications

Introduction – Types of simulation – Limitations of simulation techniques – Phases of simulation study – Generation of random numbers – Monte Carlo simulation – Applications to queuing problems.

9 Hours

Unit V

Classical Optimization Theory

Unconstrained external problem – Newton Raphson method – Equality constraints – Lagrangian method – Kuhn Tucker conditions.

9 Hours

Unit VI[$]

Shortest route problem, Maximal flow model, CPM & PERT

Total: 45+30 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Reference(s)

1. Richard Johnson, Miller and Freund's Probability and Statistics for Engineers, Prentice Hall, New Delhi, 8th Edition, 2010.
2. J K Sharma , Operations Research: Theory and Applications , Laxmi Publications, New Delhi , 5th Edition 2013
3. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, 11th Edition, 2014.
4. H. A. Taha, Operations Research – An Introduction, Prentice Hall of India Ltd, New Delhi, 9th Edition ,2014.

15SE12 SOFTWARE ENGINEERING METHODOLOGIES

3 0 0 3

Course Objectives

The Systematic approach to design, synthesize, and analyze software systems of increasing size and complexity at various development levels, from the individual component to the entire system architecture.

Course Outcomes (COs)

At the end of the course, the student will be able to

1. Plan and deliver an effective software engineering process based on knowledge of widely used development lifecycle models.
2. Translate a requirements specification into an implementable design, following a structured and organized process.
3. Manage time, processes and use the resources effectively by prioritizing competing demands to achieve software quality and assurance

Unit I

The Process

Software Engineering the nature of Software -Software Process Models: Waterfall Model- Incremental process models- Evolutionary process models: Prototyping-Spiral model – Concurrent model- Comparison study of Software Process Models -Introduction to Agile process – Computer Based Systems – System Engineering Hierarchy. System Modeling

9 Hours

Unit II

Requirements Analysis

Requirements Engineering- tasks – Initialization the Requirement Engineering process - Establishing the groundwork-Eliciting requirements-Building the requirements model-Validating Requirements – Requirements analysis-Model Approaches – Data Modeling Concepts- Class Based Modeling - Behavioral Model. Analysis Modeling.

9 Hours

Unit III

Design Concepts and Principles

The Design concepts-The Design model-Architectural design-Designing Class Based Components -User interface design: user analysis and design, Interface analysis, Interface design steps-Requirements modeling: Flow oriented modeling, Case Studies.

9 Hours

Unit IV

Managing the Software Projects

The Management spectrum – W5HH principle – Metrics for Process and Projects – Software Scope and Feasibility -Software Measurement – Software Project Estimation – Decomposition

Techniques – Project Scheduling –Risk Management – Identification – Projection – RMMM Plan- Management Spectrum

9 Hours

Unit V

Software Quality Assurance

A Strategic Approach to Software Testing- Unit Testing- Integration Testing- Validation Testing - System Testing- Elements of Software Quality Assurance- SQA Tasks, Goals and Metrics-Software Review Techniques: Informal reviews-Formal Technical Reviews-Software Reliability-Software Configuration Management-The SCM Process- Version Control- Change Control-Configuration Audit.

9 Hours

Unit VI[$]

Real Time Systems, Software Maintenance, The art of debugging

Total: 45 Hours

Reference(s)

1. Roger S. Pressman, *Software Engineering: A Practitioner Approach Eighth Edition*, McGraw- Hill, 2015
2. I. Summerville, *Software Engineering*, Ninth Edition, Pearson Education, 2011.
3. Carlos Otero, *Software Engineering Design: Theory and Practice*, CRC Press 2012.

15SE13 DATA STRUCTURES AND ALGORITHMS

3 0 0 3

Course Objectives

- To evaluate running time for algorithms
- To apply algorithm design techniques for solving real world problems
- To analyze the algorithms and their complexity including NP completeness

Course Outcomes (COs)

1. Students will be able to design and apply appropriate data structures for the given problem
2. Students will improve their problem solving skills and algorithm design skills
3. Students will have proficiency in algorithm and complexity analysis

Unit I

Algorithm Analysis and Tree ADTs

Mathematical Backgrounds - Algorithms: Running time calculation – Trees: Red black trees, B-trees - Binomial and Fibonacci heaps

9 Hours

Unit II

Algorithm Design Techniques

Greedy technique-: Knapsack problem - Divide and conquer: Quick Sort - Dynamic Programming: Optimal binary search trees, Long Integer Multiplication, Longest Common Subsequence – Backtracking - n-queens problem - Branch and bound. Problems, subset sum problem, travelling salesman problem.

9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit III

Graph Algorithms

Undirected Graphs – Directed Graphs –Strongly connected Components - Minimum Spanning Trees - Single-Source Shortest Paths: Bellman-Ford algorithm - All-Pairs Shortest Paths: Floyd-Warshall algorithm, Johnson's algorithm

9 Hours

Unit IV

Data Structures for Strings

Tries and Compressed Tries - Sub String Search: Naive string-matching algorithm - BM algorithm - String matching with finite automata - KMP algorithm.

9 Hours

Unit V

NP-Completeness

NP-Completeness: Polynomial time - Polynomial-time verification - NP-completeness and reducibility- NP-completeness proofs-5 NP-complete problems.

9 Hours

Unit VI[$]

Data structures for IP Router Tables- Data structures for Database –Data structures for Web Information Retrieval – Data structures for Images.

Total: 45 Hours

Reference(s)

1. T H Cormen, Charles Leiserson, Ronald R Rivest, Clifford Stein, *Introduction to Algorithms*, Third Edition, PHI, 2012.
2. Robert Sedgewick, Kevin Wayne, *Algorithms*, 4th edition, Pearson , 2011.
3. Peter Brass, *Advanced Data Structures*, Cambridge University Press, 2008.
4. A. V. Aho, J. E. Hopcroft, and J. D. Ullman,*Data Structures and Algorithms*, Pearson, 2006.
5. Dinesh P. Mehta, Dinesh P. Mehta, SartajSahni, *Handbook of Data Structures and Applications*, Chapman and Hall/CRC, 2007

15SE14 DATABASE SYSTEMS

3 0 0 3

Course Objectives

- To understand the Relational Database Design concepts
- To study the Database Systems Architectures
- To introduce the optimization techniques in Query processing
- To build and maintain applications and administer Database Systems

Course Outcomes (COs)

1. Student will be able to understand the concepts of Relational Database Concepts
2. Student will be able to build and optimize the Database Queries
3. Student will be able to develop and maintain databases for real time application

Unit I

Relational Database

Features of Good Relational Design – Atomic Domains and First Normal Form – Decomposition Using Functional Dependencies – Functional Dependency Theory - Algorithms for

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Decomposition- Decomposition Using Multi valued Dependencies - More Normal Forms - Database-Design Process - Modeling Temporal Data.

9 Hours

Unit II

Query Processing and Optimization

Measures of Query Cost-Selection Operation – Sorting - Join Operation-Other Operations - Evaluation of Expressions; Query Optimization – Transformation of Relational Expressions - Estimating Statistics of Expression - Choice of Evaluation Plans- Materialized Views-Advanced Topics in Query Optimization.

9 Hours

Unit III

Database-System Architectures

Centralized and Client–Server Architectures - Server System Architectures - Parallel Systems - Distributed Systems-Network Types. Parallel Databases: Introduction - I/O Parallelism – Inter query Parallelism - Intra query Parallelism – Intra operation Parallelism – Inter operation Parallelism.

9 Hours

Unit IV

Query Optimization and Distributed Database

Query Optimization- Design of Parallel Systems - Parallelism on Multicore Processors. Distributed Databases: Homogeneous and Heterogeneous Databases - Distributed Data Storage-Distributed Transactions – Commit Protocols - Concurrency Control in Distributed Databases-Availability - Distributed Query Processing - Heterogeneous Distributed Databases Cloud-Based Databases- Directory Systems.

9 Hours

Unit V

Mobility and Transaction Processing

Spatial, Temporal Data and Mobility: Time in Databases- Spatial and Geographic Data - Multimedia Databases- Mobility and Personal Databases - Transaction Processing: Transaction-Processing Monitors – Transactional Workflows - E-Commerce - Main-Memory Databases - Real-Time Transaction Systems - Long-Duration Transactions.

9 Hours

Unit VI[$]

XML databases, Web databases, Cloud based databases, Introduction to Big-data

Total: 45 Hours

Reference(s)

1. Silberschatz,Henry F. Korth,S. Sudarshan, *Database System Concepts*, McGraw-Hill ,Sixth Edition, 2010.
2. Ramez Elmasri,Shamkant B. Navathe, *Fundamentals of Database Systems*, Pearson, Sixth Edition, 2010.

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

15SE15 SOFTWARE PROJECT MANAGEMENT

3 0 0 3

Course Objectives

- To provide basic project management skills with a strong emphasis on issues and problems associated with delivering successful IT projects.

Course Outcomes (COs)

At the end of the course, the student will be able to

1. Understand and practice the process of project management and its application in deliveringsuccessful IT project.
2. Identify the resources required for a project and to produce a work plan, resource schedule and to quantify the likely effect of risk on project timescales.
3. Develop working skills in planning and managing, design and implement of information system for people and organizing teams.

Unit I

Introduction to Software Project Management

Introduction, the state of IT project management, context of project management, need of project management,project goals, project life cycle and IT development, extreme project management, PMBOK. Project Definition –Contract Management – Activities Covered By Software Project Management – Overview of Project Planning –Stepwise Project Planning.

9 Hours

Unit II

Developing the Project Charter and Project Plan

Introduction, project management process, project integration management, the project charter, project planning framework, the contents of a project plan, the planning process, The Work Breakdown Structure (WBS), the linear responsibility chart, multidisciplinary teams.

9 Hours

Unit III

The Project's Schedule, Budget and Risk Management

Introduction, developing the project schedule, project management software tools, methods of budgeting, developing the project budget, improving cost estimates, finalizing the project schedule and budget. IT project risk management planning process, identifying IT project risks, risk analysis and assessment, risk strategies, risk monitoring, and control, risk responses and evaluation.

9 Hours

Unit IV

The Project Communication Plan

Introduction, monitoring and controlling the project, the project communications plan, project metric, project control, designing the control system, the plan-monitor-control cycle, data collection and reporting, reporting performance and progress, information distribution.

9 Hours

Unit V

Managing People and Organizing Teams

Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right PersonFor The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model –Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures

9 Hours

Unit VI[$]

Software effort estimation, resource allocation, software quality

Total: 45 Hours

Reference(s)

1. Bob Hughes, Mikecotterell, *Software Project Management*, Fifth Edition, Tata McGraw Hill, 2013.
2. Jack T. Marchewka, *Information Technology Project Management*, 3rd edition, Wiley India, 2009
3. Jalote, *Software Project Management in Practice*, Pearson Education, 2002
4. S. J. Mantel, J. R. Meredith and et.al., *Project Management Core Text Book*, John Wiley India, 2011

15SE17 DATA STRUCTURES AND ALGORITHMS LABORATORY

0 0 4 2

Course Objectives

- To implement the data structures using list implementation
- Toapply algorithm design techniques to provide the solution for the problems
- To analyze the various algorithms and their complexity.

Course Outcomes (COs)

1. Students will be able to apply appropriate data structures for the given problem
2. Students will improve their problem solving skills and algorithm design skills
3. Students will have proficiency in algorithm and complexity analysis

List of Experiments

1. Linear data structures
2. B-Tree implementation
3. Red Black Tree implementation
4. Dynamic Programming Algorithms
5. Backtracking and Branch and Bound Algorithms
6. Minimum spanning Trees
7. Shortest path algorithms
8. Tries for String

Total: 60 Hours

15SE18 DATABASE SYSTEMS LABORATORY

0 0 4 2

Course Objectives

- To apply the Relational Database Design concepts
- To analyze and optimize the SQL Query
- To design a database for real time Application

Course Outcomes (COs)

1. Student will be able to build and optimize the Database Queries
2. Student will be able to design and implement databases for real time Applications
3. Student will be able to create Web based Applications

List of Experiments

1. SQL Queries and No-SQL
2. Design of Databases (Normalization)

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

3. Design distributed database
4. Implement deadlock detection algorithm for distributed database
5. Database Query Optimization (TOAD for MYSQL)
6. Database Application Development
7. Application development with Cloud Databases
8. Mini Project

Total: 60 Hours

15GE19 BUSINESS ENGLISH I

1 0 2 2

Course Objectives

- To acquire skills for using English in workplace effectively.
- To communicate for essential business needs.
- To prepare students for taking BEC Vantage level examination which is an International Benchmark for English language proficiency of Cambridge English Language Assessment (CELA).

Course Outcomes (COs)

1. To enable students to get International recognition for work and study.
2. To use English confidently in the International business environments.
3. To be able to take part in business discussion, read company literature, write formal and informal business correspondences and listen and understand business conversations.

Unit I

Grammar and Vocabulary

Comparison of adjectives – forming questions – asking complex questions – expressing purpose and function – tenses – conditionals – time statements – modal verbs – active and passive voice – articles – direct and indirect speech – cause and effect – relative pronouns – expressions followed by – *ing* forms – countable / uncountable – acronyms – marketing terms / vocabulary – financial terms – collocations – discourse markers.

10 Hours

Unit II

Listening

Purposes of listening – features of listening texts – potential barriers to listening – specific listening skills – strategies to use when listening– distinguishing relevant from irrelevant information – gap filling exercise – multiple-choice options – note completion – matching and multiple choice questions – listening for specific information, gist, topic, context and function.

7 Hours

Unit III

Speaking

Word and sentence stress – clear individual sounds – turn taking – initiating and responding - intonation patterns – pronunciation – mother tongue intrusion– conversation practice – turn-taking and sustaining the interaction by initiating and responding appropriately.

10 Hours

Unit IV

Reading

Purposes of reading – potential barriers to reading – paraphrasing – identifying facts and ideas – skimming and scanning for information – matching statements with texts– spotting reference words – understanding text structure – understanding the ideas in a text – distinguishing between the correct answer and the distractor – understanding cohesion in a text – deciphering contextual meaning of words and phrases – cloze – proof reading - transcoding.

8 Hours

Unit V
Writing
Paragraphing a text – using appropriate connectives – editing practice –Longer Documents: writing a proposal.

10 Hours
Total: 45 Hours

Reference(s)
1. Guy Brook-Hart, "*BEC VANTAGE: BUSINESS BENCHMARK Upper-Intermediate – Student's Book*", 1st Edition, Cambridge University Press, New Delhi, 2006.
2. Cambridge Examinations Publishing, "*Cambridge BEC VANTAGE – Self-study Edition*", Cambridge University Press, UK, 2005.

15SE21 RESEARCH METHODOLOGY

3 0 0 3

Course Objectives
- To import the knowledge on analysis of Research methodology
- The students will be able to estimate the performance of different testing method for research.

Course Outcomes (COs)
1. The Students will be able to analysis the methods used for data collection hypothesis testing and sampling process for research methodology

Unit I
Introduction
Definition, mathematical tools for analysis, Types of research, exploratory research, conclusive research, modeling research, algorithmic research, Research process- steps.
Data collection methods- Primary data – observation method, personal interview, telephonic interview, mail survey, questionnaire design. Secondary data- internal sources of data, external sources of data.

9 Hours

Unit II
Sampling Methods
Scales – measurement, Types of scale – Thurstone's Case V scale model, Osgood's Semantic Differential scale, Likert scale, Q- sort scale. Sampling methods- Probability sampling methods – simple random sampling with replacement, simple random sampling without replacement, stratified sampling, cluster sampling. Non-probability sampling method – convenience sampling, judgment sampling, quota sampling.

9 Hours

Unit III
Hypotheses Testing
Testing of hypotheses concerning means -one mean and difference between two means -one tailed and two tailed tests, concerning variance – one tailed Chi-square test.

9 Hours

Unit IV
Basics of Computer Science Research
Introduction to Formal Models and Computability: Turing Machine & Computability, Undecidability, Diagonalization and Self-Reference, Reductions.
Introduction to Basic Techniques for Designing Algorithms: Divide-and-Conquer, Dynamic Programming, Greedy. Analysis of Algorithms.
Complexity Theory: Resources and Complexity Classes, Relationship between Complexity Classes, Reducibility and Completeness, P vs NP problems.

13 Hours

Unit V
Report Writing
Report writing- Types of report, guidelines to review report, typing instructions, oral presentation
5 Hours

Unit VI[$]
Case Study: apply Research Methodology principles into design and manufacturing field.
Total: 45 Hours

Reference(s)
1. 1. Kothari, C.R., *Research Methodology –Methods and techniques*, New Age Publications, New Delhi, 2009.
2. Panneerselvam, R., *Research Methodology*, Prentice-Hall of India, New Delhi, 2004

15SE22 SOFTWARE COMPONENT ARCHITECTURE

3 0 0 3

Course Objectives
- To study about the software components and their interaction methodologies
- A brief knowledge about Component Based Software development
- To gain practical understanding on Component Technologies

Course Outcomes (COs)
1. Induces the basic knowledge on software components with their interoperability among various other domains
2. Enhances the use of software components in the distributed environment with practical knowledge on various component technologies evolving in the market
3. Enable the students to develop a component software that can be used in any real time applications with greater functionality
4. Eases the design a software component that can be integrated in any of the business environment
5. Greater understanding of cloud based component development and the traditional approach

Unit I
Introduction
Software Components - Component models and Component Services-myths in Component Based Technology - Risk Factors - Success Factors, Component Based Software Development- Case Study: Testing tools for Component based Development.
9 Hours

Unit II
Components, Architecture and Process
Component Architecture, Component Frameworks, Component Development, component distribution and acquisition, Component assembly, markets and components-Case Study: Earth System Modeling Framework (ESMF), Middleware Vs Cloud in distributed computing.
9 Hours

Unit III
Design of Software Components
Software Components and the UML Component Infrastructures - Business Components - Components and Connectors - Designing Models of Modularity & Integration-Case Study: Buildap.
9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit IV

Distributed Systems

Introduction to Distributed systems-examples of distributed systems, challenges-Architectural models- Fundamental models - Introduction to interprocess communications-External data representation and marshalling- Client server communication-Group communication – Case study: IPC in UNIX

9 Hours

Unit V

Component Technologies

Overview of the Following Component Models: CORBA-CORBA services-CORBA component model-model driven architecture, COM+, Distributed COM, Enterprise Java Beans-EJB containers, Software Agents-Interaction and Interface between agents. – Case study: CORBA RMI.

9 Hors

Unit VI[$]

RMI-IIOP, Black Box component framework- EJB Timers-EJB & J2EE Integration-Component-oriented programming-Component design and implementation tools – testing tools - assembly tools.

Total: 45 Hours

Reference(s)

1. GeorgeT.Heinemen, William T. Councill, *Component Based Software Engineering*, Addison-Wesley Longman Publishing Co., Inc. Boston, MA, USA, 2001 -digitized 2011.
2. George Coulouris, Jean Dollimore, Tim Kindberg *Distributed Systems Concepts and Design*, Fifth Edition – 2012- Pearson Education Asia.
3. Clemens Szyperski, *Component Software: Beyond Object-Oriented Programming*, Pearson Education publishers, 2009 Reprint.
4. Ed Roman, *Mastering Enterprise Java Bean*, John Wiley & Sons Inc., 2005.
5. Thomas J.Mowbray, William A.Ruh, *Inside CORBA Distributed Object Standards and Applications*, Addison – Wesley, 2001.
6. Dale Rojerson, *Inside COM*, Microsoft Press, 2001.

15SE23 SOFTWARE TESTING AND QUALITY ASSURANCE

3 0 0 3

Course Objectives

Test the software by applying testing techniques to deliver a product free from bugs

- Evaluate the web applications using bug tracking tools.
- Explore the test automation concepts and tools
- Deliver quality product to the clients by way of applying standards such as TQM, Six Sigma
- Evaluate the estimation of cost, schedule based on standard metrics

Course Outcomes (COs)

1. Know the input and deliverables of the testing process.
2. Understand appropriate technological tools to analyze, test and automate the elements of software quality assurance.

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit I

Testing Environment and Test Processes

World-Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing – Developing the Test Plan – Verification Testing – Analyzing and Reporting Test Results – Acceptance Testing – Operational Testing – Post Implementation Analysis.

9 Hours

Unit II

Testing Techniques and Levels of Testing

Using White Box Approach to Test design - Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing - Unit Testing – Integration Testing - Defect Bash Elimination. System Testing - Usability and Accessibility Testing – Configuration Testing - Compatibility Testing - Case study for White box testing and Black box testing techniques.

9 Hours

Unit III

Incorporating Specialized Testing Responsibilities

Testing Client/Server Systems – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Object-Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Challenges in Testing for Web-based Software – Testing a Data Warehouse - Case Study for Web Application Testing.

9 Hours

Unit IV

Test Automation

Selecting and Installing Software Testing Tools - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug – Debugging – Case study using Bug Tracking Tool.

9 Hours

Unit V

Software Testing and Quality Metrics

Testing Software System Security - Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.

9 Hours

Unit VI[$]

Testing for software quality, WinRunner, LoadRunner, Celenium

Total: 45 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Reference(s)

1. William Perry, *Effective Methods of Software Testing*, Third Edition, Wiley Publishing 2007
2. Srinivasan Desikan and Gopalaswamy Ramesh, *Software Testing – Principles and Practices*, Pearson Education, 2008.
3. Naresh Chauhan, *Software Testing Principles and Practices* , Oxford University Press , New Delhi , 2010.
4. Dale H. Besterfiled et al., *Total Quality Management*, Pearson Education Asia, Third Edition, Indian Reprint (2011).

15SE24 OPERATING SYSTEMS

3 0 2 4

Course Objectives

- To know the components of an operating system.
- To have a thorough knowledge of process and storage management
- To know the concepts of I/O and file systems

Course Outcomes (COs)

1. Ability to design and implement efficient algorithms for the problem under consideration
2. Ability to choose appropriate solutions for the given problem.
3. A thorough knowledge on coding skills.

Unit I

Processes and Threads

Introduction to operating systems – review of computer organization – operating system structures – system calls – system programs – system structure – virtual machines. Processes: Process concept – Process scheduling – Operations on processes – Cooperating processes – Inter-process communication – Communication in client-server systems. Case study: IPC in Linux. Threads: Multi- threading models – Threading issues. Case Study: P-threads library.

9 Hours

Unit II

Process Scheduling and Synchronization

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux. Process Synchronization: The critical section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – critical regions– Monitors. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

9 Hours

Unit III

Storage Management

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing. Case Study: Memory management in Linux

9 Hours

Unit IV

File Systems

File-System Interface: File concept – Access methods – Directory structure –File-system mounting – Protection. File-System Implementation: Directory implementation – Allocation methods – Free- space management –Efficiency and performance – recovery – log-structured file systems. Case studies: File system in Linux – filesystem in Windows XP.

9 Hours

Unit V

I/O Systems

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem – streams – performance. Mass- Storage Structure: Disk scheduling – Disk management – Swap-space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O in Linux

9 Hours

Unit VI[$]

IPC in Linux. Threads: Multi- threading models – Threading issues, Pthreads , Library, Memory management in Linux, File system in Linux – file system in Windows XP, I/O in Linux

Lab Components

1. Process creation and execution
2. Implementation of process scheduling algorithm
3. Design of thread using Linux/UNIX thread
4. Simulation of Inter process

Total: 45+30 Hours

Reference(s)

1. Silberschatz, Galvin, and Gagne, *Operating System Concepts*, Ninth Edition, Wiley India Pvt Ltd, 2012.
2. Andrew S. Tanenbaum, *Modern Operating Systems*, Third Edition, Pearson Education/PHI, 2007
3. Harvey M. Deitel, *Operating Systems*, Second Edition, Pearson Education Pvt. Ltd, 2002
4. William Stallings, *Operating System*, Prentice Hall of India, 4th Edition, 2003

15SE27 SOFTWARE COMPONENT AND TESTING LABORATORY

0 0 4 2

Course Objectives

- Comprehend vital distinctiveness of tool used for test automation.
- Identify and utilize software tool rationale that meets the precise requirements.

Course Outcomes (COs)

1. Know the input and deliverables of the testing process.
2. Understand appropriate technological tools to analyze, test and automate the elements of software quality assurance.

List of Experiments

1 Develop a White Box Testing for various work models

a. ATM System
b. Expert System

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

c. Stock Maintenance etc.,

2. Do the following testing for a chosen software implementation using any commercial or freeware tools:
   a. Path-testing
   b. Transaction-flow testing.
   c. Data-flow testing.
3. Do the following measurements on a chosen software implementation:
   a. JUnit Test
   b. McCabe's Cyclomatic Complexity
   c. Simulate a test driver
4. Develop a simple software testing tool for implementing in web based systems.
   a. Simulate a tool that reflects
   b. Black Box Testing
   c. System Testing
5. Implement a Load testing process using JSP program.
6. Mobile Apps Testing

Total: 60 Hours

15GE29 BUSINESS ENGLISH II

1 0 0 1

Course Objectives

- To acquire skills for using English in business environment .
- To communicate appropriately in business contexts.
- To prepare students for taking BEC Vantage level examination conducted by the Cambridge English Language Assessment (CELA).

Course Outcome (COs)

1. To enable students to acquire business terms for communication.
2. To use English confidently in the business contexts.
3. To be able to take part in business discussion and write formal and informal business correspondences.

Unit I

Speaking

Non-verbal communication – agreeing / disagreeing, reaching decisions, giving and supporting opinions – making mini presentations – extending on conservations – collaborative task – tongue twisters.

6 Hours

Unit II

Writing

Business letters – fax – Shorter Documents: e-mail - memo – message - note – report writing – formal / informal styles.

9 Hours

Total: 15 Hours

Reference(s)

1. Guy Brook-Hart, "*BEC VANTAGE: BUSINESS BENCHMARK Upper-Intermediate – Student's Book*", 1st Edition, Cambridge University Press, New Delhi, 2006.
2. Cambridge Examinations Publishing, "*Cambridge BEC VANTAGE – Self-study Edition*", Cambridge University Press, UK, 2005.

15SE51 CLOUD COMPUTING

3 0 0 3

Course Objectives

- To introduce the fundamentals of cloud computing
- To introduce the data storage and collaboration in the cloud
- To enable the students to design and code cloud based applications.

Course Outcomes (COs)

1. The students will be able to design and code cloud based applications.
2. The students will be able to deploy and manage cloud solutions.

Unit I

Virtualization and Cloud Computing Architecture

Introduction to PaaS, Iaas, Saas and Identity as a Service. Understanding virtualization, Leveraging blade servers, server virtualization, desktop virtualization, Desktop solutions on demand, Virtual networks, data storage virtualization

9 Hours

Unit II

CDC & VDC

Object Based and Unified storage technologies-Backup and replication Technologies-CDC Management, Virtual Lan (VLAN) and VSAN - Traffic Management Techniques in VDC.

9 Hours

Unit III

OpenStack Services

Keystone OpenStack Identity Service, Starting OpenStack Image Service, Starting OpenStack Compute, OpenStack Networking

9 Hours

Unit IV

OpenStack Storage

Installing OpenStack Object Storage, Using OpenStack Object Storage, Administering OpenStack Object Storage, Starting OpenStack Block Storage, OpenStack Dashboard

9 Hours

Unit V

Cloud Platforms and Applications

Amazon Web Applications – Google Apps Scripts - Google App Engine – Microsoft Azure – Third Party Cloud Services, VMware and Citrix Products for cloud solutions.

9 Hours

Unit VI[$]

Dynamic details using CSS, automate your files and templates, collecting data, workflows, Mash Up

Total: 45 Hours

Reference(s)

1. Kevin Jackson, Kody Bunch, *Openstack Cloud Computing cookbook*, Second Edition, PackT Publishing, 2013.

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

2. Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi S ―*Mastering in Cloud Computing*, McGraw Hill Education, (India) Private Limited, 2013.
3. Kris Jamsa, *Cloud Computing*, Jones & Bartlett Learning, 2013.

15SE52 DATA WAREHOUSING AND MINING

3 0 0 3

Course Objectives

- To introduce the need for Business Intelligence
- To Introduce the design of data warehouse and its implementation
- To understand the various classical data mining algorithms including prediction, classification and Clustering
- To introduce the concepts including text mining and web mining.

Course Outcomes (COs)

1. Ability design and implement data warehouse for specific business domains
2. Ability to analyze various data mining algorithms and ability to choose apply appropriate algorithms

Unit I

Data Warehouse and OLAP Technology

Introduction to data warehouse, Multidimensional Data Model, Data warehouse architecture, data warehouse implementation, Introduction to data cube computation - Data cube computation algorithms

9 Hours

Unit II

Classification and Prediction

Classification and Prediction, Issues, Decision Tree Induction, Bayesian classification, Back propagation, Support vector machines, prediction, accuracy and error measures.

9 Hours

Unit III

Data Clustering

Types of data, Partitioning methods, Hierarchical methods, density based methods, model based methods, outlier analysis, Cluster tendency Analysis - vat algorithm.

9 Hours

Unit IV

Association Mining

Frequent itemset mining methods, Apriori Algorithm, FP-growth Algorithm, Mining Closed Itemsets - Algorithms, Graph mining, social network analysis - DCI-Close and High Dimensional Algorithms

9 Hours

Unit V

Advanced Topics

Text Mining, Mining the World Wide Web, Current research trends, Introduction to Bigdata Analytics

9 Hours

Unit VI[$]

Multi-relational data mining, data mining applications, social impacts of data mining

Total: 45 Hours

Reference(s)

1. Jiawei Han, Kamber, *Data Mining - Concepts and Techniques*, Third Edition, Elsevier, 2012
2. *Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses*, Wiley, 2013.

15SE53 XML AND WEB SERVICES

3 0 0 3

Course Objectives

- To study the essentials of Data interoperability using XML and well-formed XML documents.
- To understand the concepts of SOA and Web Service Protocols.
- To learn about the key building blocks of web services.

Course Outcomes (COs)

1. Students will be able to assess and evaluate the role of XML for the management and delivery of electronic information.
2. Students will have an understanding of the principles and role of structured generic markup.
3. Students will be able to Deploy and Publish Web Services
4. Able to understand Web Services and its Infrastructure.

Unit I

Introduction of XML

XML – benefits – Structuring with schemas - DTD – XML Schemas – XML processing – DOM – SAX – presentation technologies – XSL – XFORMS – XHTML – Transformation – XSLT – XLINK –XPOINTERS - XPATH

9 Hours

Unit II

Applied XML and Web Services

Standards - Stack Layers - Stack Aspects –presentation - security – query – semantics - Service-oriented Architecture (SOA) – Architecting web services – Implementation view – Web services technology stack – Logical view – Composition of web services – Deployment view.

9 Hours

Unit III

Web Services Protocols

Transport protocols for web services – Messaging with web services - Protocols - SOAP - Describing web services – WSDL – Anatomy of WSDL – Manipulating WSDL – Web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad-Hoc Discovery - Securing web services

9 Hours

Unit IV

Implementing XML in E-Business

B2B – B2C Applications – Different types of B2B interaction – Components of e-business XML systems – EbXML – RosettaNet - Applied XML in vertical industry – Web services for mobile devices.

9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit V
XML Content Management and Security
Semantic Web – Role of Meta data in web content - Resource Description Framework – RDF schema – Architecture of semantic web – Content management workflow – XLANG – WSFL.
9 Hours

Unit VI[$]
XQuery, Web services, securing web services
Total: 45 Hours

Reference(s)
1. B V Kumar , S V Subrahmanya, *Web Services an Introduction*, Tata McGraw-Hill 2008.
2. Ron Schmelzer ,*XML and Web Services – Unleashed*, Pearson Education, 2002.
3. Frank P Coyle ,*XML Web Services and the Data Revolution*, Addison-Wesley, 2002.

15SE54 SOFT COMPUTING

3 0 0 3

Course Objectives
- To introduce the basics of Fuzzy Set Theory, Optimization and Neural networks
- To learn Feature extraction , Classification and Recognition techniques
- To implement the methods for handwritten characters in Matlab

Course Outcomes (COs)
1. The students will acquire the theoretical knowledge on Fuzzy Set theory, Optimization and Neural
2. The students will learn about supervised and unsupervised Learning methodologies of Neural Networks and its applications

Unit I
Introduction to soft computing
Introduction to Soft Computing and Neural Networks Introduction - Soft computing constituents – From conventional AI to computational intelligence – Evolutionary computation – Neuro-Fuzzy and soft computing characteristics.
9 Hours

Unit II
Basics of Neuroscience and Ann Models
The Brain as a Neural Network - Basic Properties of Neurons - Neuron Models - Machine Learning using Neural Network, Adaptive Networks – Feed Forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance Architectures – Advances in Neural Networks.
9 Hours

Unit III
Fuzzy Systems
Fuzzy Sets and Fuzzy Reasoning - Fuzzy Matrices - Fuzzy Functions - Decompositions - Fuzzy Automata and Languages - Fuzzy Control Method - Fuzzy Decision Making.
9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit IV

Neuro-Fuzzy Modeling

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rule base Structure Identification – Neuro-Fuzzy Control – Case Studies.

9 Hours

Unit V

Genetic Algorithms

Introduction, Building block hypothesis, working principle, Basic operators and Terminologies like individual, gene, encoding, fitness function and reproduction, Genetic modeling: Significance of Genetic operators, Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, GA optimization problems, JSPP (Job Shop Scheduling Problem), TSP (Travelling Salesman Problem),Differences & similarities between GA & other traditional methods, Applications of GA**.**

9 Hours

Unit VI[$]

Random Optimization, Simulated Annealing, Tabu Search, Ant Colony Optimization, Particle Swarm Optimization, Bat Algorithm, Applications of Soft Computing techniques in Medical and Image compression algorithms..

Total: 45 Hours

Reference(s)

1. Stuart Russell, Peter Norvig, *Artificial Intelligence : A modern approach*, Pearson, 2009.
2. B. Yegnanarayana, *Artificial Neural Networks*, PHI, New Delhi, 2009.
3. Jyh-Shing Roger Jang, Chuen-Tsai Sun and Eiji Mizutani, *Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence*, New Delhi: Prentice-Hall of India, 2003
4. S. N. Sivanandam, S. N. Deepa, *Introduction to Genetic Algorithms*, Springer, 2007.
5. Timothy J. Ross, *Fuzzy Logic with Engineering Applications*, Wiley, 2010 Third Edition.
6. G. J. Klir & B. Yuan, *Fuzzy Sets & Fuzzy Logic*, PHI, India 1995.
7. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, *Genetic Algorithms and Genetic Programming: Modern Concepts and Practical Applications*, CRC Press. 2009.
8. David E. Goldberg, *Genetic Algorithms - In Search, optimization and Machine Learning*, Pearson Education, 1989.
9. S. N. Sivanandam, S. N. Deepa, *Principles of Soft Computing*, John Wiley & Sons, 2007.
10. Dan Simon, *Evolutionary Optimization Algorithms*, Wiley, 2013.

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

15SE55 DIGITAL IMAGE PROCESSING

3 0 0 3

Course Objectives

- The primary objective of this course is to introduce students to basic principles of digital images, image data structures, and image processing algorithms.
- Gain experience in applying image processing algorithms to real problems.
- Useful skill base that would allow them to carry out further study should they be interested and to work in the field.

Course Outcomes (COs)

1. At the end of the course the student should have a clear impression of the breadth and practical scope of digital image processing and have arrived at a level of understanding that is the foundation for most of the work currently underway in this field.
2. Explore advanced topics of Digital Image Processing.
3. Make a positive professional contribution in the field of Digital Image Processing.

Unit I

Fundamentals of Digital Image Transforms

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and Discrete Fourier Transform (DFT) – Properties of 2D Fourier Transform – Fast Fourier Transform(FFT) – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve (Hotelling) transforms

9 Hours

Unit II

Image Enhancement Techniques

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters: Smoothing – Sharpening filters – Homomorphic filtering

9 Hours

Unit III

Image Restoration and Feature Extraction

Model of Image Degradation/restoration process – Noise models – Inverse filtering -Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition. Image feature description - Interpretation of Line drawings, Image pattern recognition algorithms

9 Hours

Unit IV

Image Compression

Lossless compression: Variable length coding – LZW coding – BIT plane coding- predictive coding-DPCM. Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG2000, MPEG, Basics of Vector quantization.

9 Hours

Unit V

Image Segmentation and Representation

Edge detection – Thresholding - Region Based segmentation – Boundary representation: chair codes- Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors – Regional descriptors –Simple descriptors –Texture

9 Hours

Unit VI[$]

Histogram processing, noise models, color models, color segmentation, error free compression

Total: 45 Hours

Reference(s)

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, *Digital Image processing*, Pearson Education, 2007
2. S. Jayaraman, S. Esakkirajan, T. Veerakumar, *Digital Image Processing*, Tata McGraw Hill education private limited, 2009.
3. William K Pratt, *Digital Image Processing*, John Willey,2007.
4. MillmanSonka, Vaclav Hlavac, Roger Boyle, Broos/colic, *Learning Image Processing analysis and Machine Vision*, Thompson, 2006
5. Chanda Dutta Majumdar, *Digital Image Processing and Applications*,Prentice Hall of India, 2000.
6. http://nptel.iitm.ac.in/courses/Webcourse-contents/ Digi_Img_Pro

15SE56 NETWORK ENGINEERING

3 0 0 3

Course Objectives

- Able to Understand the concepts of Networking and its management
- To study the principles and mechanisms of wireless and multimedia networks
- To study the concepts and working principles of LAN topology

Course Outcomes (COs)

1. Able to formulate and solve problems creatively in network design, routing, management, security and
2. performance
3. Design and develop the LAN topology
4. Apply the skills to use different wireless networks in real time communication systems

Unit I

Networking

Functional Elements Networking as resource sharing- The Functional Elements: Multiplexing, Switching, Routing, Network Management, Traffic controls and time scales -Network Infrastructure, Networking Architecture, X.25 and frame relay networks, The Internet, ATM networks.

9 Hours

Unit II

Wireless and Mobile Networks

Wireless links and Network characteristics -Wi - Fi:802.11 Wireless LANs: The 802.11 architecture, MAC Protocol, Frame Structure, Mobility in IP Subnet, 802.15 and Bluetooth - Cellular Internet Access - Mobility management principles - Mobile IP - Managing Mobility in cellular Networks - Wireless and Mobility: Impact on higher layer Protocols.

9 Hours

Unit III

Multimedia Networking

Multimedia Networking Applications - Streaming Stored Audio and Video - Protocols for real time Interactive Applications, RTP,RTCP, SIP- Distributing Multimedia - Scheduling and Policing Mechanisms – RSVP

9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit IV

Security in Networking

Principles of Cryptography- Authentication- Integrity: Digital Signature- Message Digest-Hash Functions - Key distribution and Certification – Public key Certification-Access Control Firewalls.

9 Hours

Unit V

Attacks and Counter Measures:

Mapping – Packet Sniffing – Spoofing-Denial of Service-Hijacking-Secure E mail-Secure Socket Layer SSL-IPsec-Security in 802.11.

9 Hours

Unit VI[$]

Network Management

The infrastructure for network Management - The Internet Standard Management Framework, Structure of Management Information: SMI, Management Information Base, SNMP protocol operations and Transport mappings, Security and Administrations - ASN.1

Total: 45 Hours

Reference(s)

1. James F. Kurose, Keith W. Ross, *Computer Networking-A Top-Down Approach Featuring the Internet*, Third Edition, Pearson Publishers, 2009.
2. Anurag Kumar, D. Manjunath, Joy Kuri, *Communication Networking-An Analytical Approach*, Morgan Kaufmann Publishers, An Imprint of Elsevier, 2006.
3. Behrouuz A.Forouzan, *Cryptography& Network Security*, Tata McGraw-Hill Publishing Company Limited 2007.

15SE57 REAL TIME SYSTEMS

3 0 0 3

Course Objectives

- To understand the real time concepts and reference models
- To analyze the real time operating systems and scheduling approaches.
- To evaluate the certain metrics used in software requirements, development during cost estimation

Course Outcomes (COs)

1. Upon completion of this course, the student will be able to:
2. Formulate real-time constraints.
3. Employ standard real-time programming constructs.
4. Develop a concept to handle the requests level of reliability

Unit I

Introduction

Basic Real-Time Concepts- Terminology, Real Time design Issues, Hardware Considerations- Basic Architecture – Hardware Interfacing - CPU-Memory – Programmed I/O - DMA – Memory Mapped I/O – Interrupts - Enhancing performance –Locality of Reference – Cache – Pipelining – Coprocessors

9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit II

Hard Versus Soft Real time systems and Reference Model

Jobs and Processors, Release time, Deadlines and Timing constraints, Hard and soft timing constraints, Processors and resources- temporal parameters of real time workload-Periodic task model-Precedence constraints and data dependency- other types of dependencies- Resource parameters of jobs and parameters of resources, Scheduling Hierarchy

9 Hours

Unit III

RTOS

Real-Time Kernels – Pseudo kernels – Interrupt - Driven Systems –Preemptive - priority Systems - Hybrid Systems - Process Scheduling – Round-Robin Scheduling - Fixed Priority Scheduling – Dynamic-Priority Scheduling – Inter task Communication and Synchronization - Memory Management

9 Hours

Unit IV

Software Systems Design

Requirement Engineering Process – Types of requirement – Requirements specification for Real-Time Systems- Properties of Software- Procedural Orientation Design – Object Orientation Design

9 Hours

Unit V

Engineering Considerations

Metrics- Linea of code, McCabe's Metrics, Hastead's Metrics, Function Points, Feature Points, Metrics for object oriented software- Faults, Failures and Bugs- Fault Tolerance- Systems Integration-Refactoring Real Time Code-Cost Estimation using COCOMO

9 Hours

Unit VI[$]

Pipelining – Coprocessors- Resource parameters of jobs and parameters of resources, Scheduling Hierarchy- Memory Management

Total: 45 Hours

Reference(s)

1. Phillip A. Laplante, *Real-Time Systems Design and Analysis*, Third Edition, Wiley-India, 2011.
2. Jane. W. S. Liu, *Real Time Systems*, Pearson Education, 2008.
3. http://support.dce.felk.cvut.cz/psr/prednasky/liu/Chapter_2.pdf

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

15SE58 OPEN SOURCE SOFTWARE

3 0 0 3

Course Objectives

- Define open source software
- Understand the motivation, theory, strengths and weaknesses of open source software.

Course Outcomes (COs)

1. Being able to approach and apply advanced frameworks and tools in a real project.
2. Identify and discuss various software licensing models

Unit I

History and Emergence of Open Source Software

The philosophy of OSS, Richard Stallman, The Cathedral and the Bazaar (CatB), commercial software vs OSS, free software vs freeware. Open source development models. Application Programming Interface (API). GNU Project**,** Free Software Foundation**.**

9 Hours

Unit II

Community Building

Importance of Communities in Open Source Movement.JBoss Community. Developing blog, group, forum, social network for social purpose.

9 Hours

Unit III

Open Standards

National Information Standards Organization (NISO), The Digital Library Federation (DLF). The Dublin Core Metadata Initiative. MARC standards, Resource Description and Access (RDA). Open Archives Initiative. OAI-PMH. Search / Retrieval via URL (SRU),SRW/CQL.Java Platform, Enterprise Edition (Java EE).

9 Hours

Unit IV

Open Source Licenses

GNU General Public License (GPL) version 2,3, GNU Lesser General Public License (LGPL) version 2.1,3, GNU Affero General Public License (AGPL) version 3, Apache License, Version 2.0, Artistic License 2.0, etc.

9 Hours

Unit V

Case Studies

Operating System - The Linux operating system and its use both for desktops and as server software. Webserver - Apache HTTP Server and its flavors. WAMP server (Windows, Apache, MySQL, PHP). Open Source MySQL. Apache, MySQL, PHP, JAVA as development platform.

9 Hours

Unit VI[$]

Open Source Software - Category of Open Source Software. OSS for podcasts, RDBMS, online social networks, etc. open source bibliometric softwares like pajek, ucinet, etc.

Total: 45 Hours

Reference(s)

1. B. Venkateshwarlu (Ed); *Introduction to Linux: Installation and Programming*, B S Publishers; 2005.
2. Matt Welsh, Matthias KalleDalheimer, Terry Dawson, and Lar Kaufman, *Running Linux*, Fourth Edition, O'Reilly Publishers, 2002.

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

3. Carla Schroder, *Linux Cookbook*, First Edition, O'Reilly Cookbooks Series, 2004
4. Open Sources: Voices from the Open Source Revolution, First Edition, January 1999, ISBN: 1-56592-582-3. URL:http://www.oreilly.com/catalog/opensources/book/toc.html
5. The Linux Cookbook: Tips and Techniques for Everyday Use, First Edition, Michael Stutz, 2001. URL: http://dsl.org/cookbook/cookbook_toc.html
6. The Linux System Administrators' Guide, Lars Wirzenius, Joanna Oja, Stephen Stafford, and Alex Weeks, December 2003. URL: http://www.tldp.org/guides.html
7. http://directory.fsf.org/GNU/
8. http://www.diglib.org
9. http://www.entirelyopensource.com/

15SE59 APP ENGINE

3 0 0 3

Course Objectives

- To introduce the fundamentals of cloud computing and App Engine
- To Introduce the Google Apps Scripts
- To introduce the Google Cloud Platform and its various features
- To Introduce the Google Cloud Sql for Application Development

Course Outcomes (COs)

1. Being able to apply App Engine for implementing real time projects in cloud
2. Ability to use Google Apps Scripts

Unit I

Introducing Cloud Computing and services

Introducing Cloud Computing, Software as a Service, Platform as a service, Infrastructure as a service, Identity as a service.

9 Hours

Unit II

App Engine

Introducing App Engine, The runtime environment, The static file servers, The data store, services, Google Accounts, Administration console

9 Hours

Unit III

Google Apps Scripts

Google Apps Scripting, Spreadsheet Limitations, Apps Script Examples, User Defined Functions, Spreadsheet and sheets, Range Object

9 Hours

Unit IV

Google Cloud Platform

Introduction to Google Cloud Platform, Infrastructure, Google Compute Engine, Google Cloud Storage, Introduction to Google App Engine, Data Store and Cloud SQL, Advanced Level – Google Bigquery, App Engine 101, Setting up the SDK, Hello World application. GAE admin console, Understanding the Java webapp environment in GAE – Servlets, JPA, Forms, Users Service

9 Hours

Unit V

Google Cloud SQL and Storage

Google API console, Using Google Cloud SQL with app engine, Managing the instances, Tools – Command line, Squirrel, Using with app engine. Google Cloud Storage, Overview, API –

Authorization, using client libraries, Using with app engine, A static website with Google Cloud Storage

9 Hours

Unit VI[$]

Datastore – Overview, API, Queries, Transactions

Total: 45 Hours

Reference(s)

1. Kris Jamsa, *Cloud Computing*, Jones & Bartlett Learning, 2013
2. Opabinia,*Google Spreadsheet Programming,Use JavaScript To Build Spreadsheet Applications In The Cloud*, leanpub, 2013
3. Dan Sanderson, *Programming Google App Engine*, O'Reilly 2010

15SE60 MOBILE AND PERVASIVE COMPUTING

3 0 0 3

Course Objectives

- To learn the basics of Wireless voice and data communications technologies.
- To provide the student with knowledge and skills about a new trend in computing

Course Outcomes (COs)

Students will be able to:

1. Analyze the strengths and limitations of the tools and devices for development of pervasive computing systems
2. Apply current software development methodologies, working effectively as an individual or within a team, in the production of a substantial piece of pervasive computing software in consultation with a client

Unit I

Introduction

Wireless networks- emerging technologies- Blue tooth, WiFi, WiMAX,3G, WATM.-Mobile IP protocols -WAP push architecture-WML scripts and applications

9 Hours

Unit II

Mobile computing management

Mobile computing environment – functions - architecture - design considerations, content architecture - CC/PP exchange protocol, context manager - Data management in WAE - Coda file system - caching schemes- Mobility QOS

9 Hours

Unit III

Mobile networks scheme

Handoff in wireless mobile networks - reference model - handoff schemes - Location management in cellular networks - Mobility models - location and tracking management schemes - time, movement, profile and distance based update strategies

9 Hours

Unit IV

Pervasive computing

Principles, Characteristics - interaction transparency, context aware, automated experience capture - Architecture for pervasive computing - Pervasive devices - embedded controls - smart sensors and actuators - Context communication and access services

9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit V

Context awareness

Open protocols - Service discovery technologies - SDP, Jini, SLP, UPNP protocols – data synchronization- SyncML framework - Context aware mobile services - Context aware sensor networks, addressing and communications -

9 Hours

Unit VI[$]

Security in mobile computing, ALI technologies, Context aware security

Total: 45 Hours

Reference(s)

1. Asoke K Taukder, Roopa R Yavagal, *Mobile Computing*, Tata McGraw Hill Pub Co., New Delhi, 2005.
2. Uwe Hansmann et al., *Pervasive Computing*, Springer, New York, 2013.
3. Seng Loke, *Context-Aware Computing Pervasive Systems*, Auer Bach Pub., New York, 2007.
4. Ivan Stojmenovic, *Handbook of Wireless Networks and Mobile Computing*, John Wiley & sons Inc, Canada, 2002.

15SE61 MACHINE LEARNING TECHNIQUES

3 0 0 3

Course Objectives

- To understand the concepts of machine learning
- To appreciate supervised and unsupervised learning and their applications
- To understand the theoretical and practical aspects of Probabilistic Graphical Models
- To appreciate the concepts and algorithms of reinforcement learning
- To learn aspects of computational learning theory

Course Outcomes (COs)

1. To implement a neural network for an application of your choice using an available tool
2. To implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results
3. To use a tool to implement typical clustering algorithms for different types of applications
4. To design and implement an HMM for a sequence model type of application
5. To identify applications suitable for different types of machine learning with suitable justification

Unit I

Introduction

Machine Learning -Machine Learning Foundations – Overview– applications -Types of machine learning -basic concepts in machine learning Examples of Machine Learning -Applications - Linear Models for Regression -Linear Basis Function Models - The Bias-Variance Decomposition -Bayesian Linear Regression -Bayesian Model Comparison

9 Hours

Unit II

Supervised Learning

Linear Models for Classification -Discriminant Functions -Probabilistic Generative Models - Probabilistic Discriminative Models -Bayesian Logistic Regression. Decision Trees - Classification Trees-Regression Trees -Pruning.

9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit III

Un-Supervised Learning

Clustering -K-means -EM -Mixtures of Gaussians -The EM algorithm in General -Model selection for latent variable models -high-dimensional spaces --The Curse of Dimensionality -Dimensionality Reduction -Factor analysis -Principal Component Analysis -Probabilistic PCA-Independent components analysis

9 Hours

Unit IV

Probabilistic Graphical Models

Directed Graphical Models-Bayesian Networks -Exploiting Independence Properties -From Distributions to Graphs -Examples -Markov Random Fields -Inference in Graphical Models -Learning –Naive Bayes classifiers-Markov Models –Hidden Markov Models –Inference –Learning-Generalization

9 Hours

Unit V

Advanced Learning

Sampling –Basic sampling methods –Monte Carlo. Reinforcement Learning-K-Armed Bandit-Elements-Model-Based Learning-Value Iteration-Policy Iteration. Temporal Difference Learning-Exploration Strategies - deterministic and Non-deterministic Rewards and Actions-Eligibility Traces-Generalization-Partially Observable States-The Setting-Example. Semi-Supervised Learning

9 Hours

Unit VI[$]

Radial Basis Functions, Undirected graphical models-Markov random fields-Conditional independence properties -Parameterization of MRFs - Examples

Total: 45 Hours

Reference(s)

1. Kevin P. Murphy, "*Machine Learning: A Probabilistic Perspective*", MIT Press, 2012
2. Christopher Bishop, "*Pattern Recognition and Machine Learning*" Springer, 2006
3. Ethem Alpaydin, "*Introduction to Machine Learning*", Prentice Hall of India, 2005
4. Tom Mitchell, "*Machine Learning*", McGraw-Hill, 1997.
5. Hastie, Tibshirani, Friedman, "*The Elements of Statistical Learning*" (2nd ed)., Springer, 2008
6. Stephen Marsland, "*Machine Learning –An Algorithmic Perspective*", CRC Press, 2009

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

15SE62 SOFTWARE MEASUREMENTS AND METRICS

3 0 0 3

Course Objectives

- Students will acquire methods to evaluate software artifacts with a rigorous and modern approach
- To depict the industry process and practices on improving the quality of in the software engineering process.

Course Outcomes (COs)

Students will be able to:

1. Outline the significance and necessity of metrics of software.
2. Illustrate the various measurements and metrics models in industry practices.
3. Implement different process to improve the quality of the software tool being developed.

Unit I

The History and Evolution of Software Metrics

Evolution of the software industry and evolution of software measurements – The cost of counting function point metrics – The paradox of reversed productivity for high-Level languages- The Varieties of functional metrics – Variations in application size and productivity rates – Future Technical Developments in Functional Metrics- Software measures and metrics not based on function points.

9 Hours

Unit II

Measuring Software Quality

Quality control and international competition – Defining quality for measurement and estimation – Five steps to software quality control- Measuring software defect removal- Measuring Defect removal efficiency – Measuring the costs of defect removal – Evaluating defect prevention methods – Measuring customer reported defects- Measuring invalid defects, Duplicate defects and special cases. Reliability Models - The Rayleigh Model- Reliability Growth Models.

9 Hours

Unit III

Process Metrics

In-Process Metrics for Software Testing - Test Progress S Curve - Testing Defect Arrivals Over Time - Product Size Over Time - CPU Utilization - Effort/Outcome Model. Complexity Metrics and Models - Lines of Code - Halstead's Software Science - Cyclomatic Complexity. - Syntactic Constructs - Structure Metrics. Metrics for Object-Oriented Projects - Concepts and Constructs - Design and Complexity Metrics - Lorenz Metrics and Rules of Thumb - CK OO Metrics Suite - Productivity Metrics.

9 Hours

Unit IV

Mechanics of Measurement

Software Assessments – Software Baselines – Software Benchmarks- What a Baseline analysis covers – Developing or Acquiring a baseline data collection Instrument – Administering the data collection questionnaire – Analysis and aggregation of the Baseline data. Measuring and Analyzing Customer Satisfaction - Surveys - Data Collection - Sampling Methods - Analyzing Satisfaction Data. Conducting In-Process Quality Assessments - Preparation - Evaluation - Quantitative Data - Qualitative Data - Evaluation Criteria - Overall Assessment.

9 Hours

Unit V

Measurements, Metrics and Industry Leadership

Measures and metrics of industry leaders – Measures, metrics and innovation – Measurements, metrics and outsource litigation – Measurements, metrics and behavioral changes – Commercial

software measurement tools. Measuring Process Maturity - Process Capability - Value of Process Improvement - Process Adoption – Process Compliance. Function Point Metrics to Measure Software Process Improvement - Software Process Improvement Sequences.

9 Hours

Unit VI[$]

Measurements process - Measuring Process Maturity, Process Capability, function point metrics to measure software process improvement, software process improvement sequences.

Total: 45 Hours

Reference(s)

1. Caper Jones, *Applied Software Measurement: Global Analysis of Productivity and Quality*, Third Edition, McGraw Hill Companies, 2008.
2. Stephen H. Kan, *Metrics and Models in Software Quality Engineering*, Addison Wesley, 2011.
3. NareshChauhan, *Software Testing Principles and Practices*, Oxford University Press, 2010.
4. RavindranathPandian C., *Software Metrics A Guide to planning, Analysis, and Application*, Auerbach, First Indian Reprint, 2011.
5. http://accessengineeringlibrary.com/browse/applied-software- measurement #p2001 b4bb 9970 509001

15SE63 SOFTWARE MAINTENANCE AND ADMINISTRATION

3 0 0 3

Course Objectives

- To introduce the fundamentals of Software Maintenance & Administration
- To study the essentials of Maintenance Process & Re-Engineering
- To learn about the Legacy system and its strategies
- To understand the concepts of Reusable Software Components.

Course Outcomes (COs)

1. Induces the basic knowledge on software maintenance and its processes with their interoperability among various other domains
2. Enhances the use of Maintenance cost factors in the distributed environment with practical knowledge on various component technologies evolving in the market
3. Enables the students to build a legacy system that can be used in any real time applications with greater functionality

Unit I

Introduction to Software Evolution

Importance of Evolution-Software Change, Types of Changes-Evolutionary Development-Evolution Processes-Change Identification & Evolution-System Evolution Process-Change Implementation-Evolution of Software Artefacts.

9 Hours

Unit II

Overview of software maintenance

The nature of software maintenance-The software maintenance types. - Characteristics of maintainable software-Lehman's laws- Maintenance cost issues using COCOMO model-Maintainability measurements and maintenance cost factors- The software maintenance process-Change requests management-Version and Release management issues.

9 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit III

Maintenance Process & Legacy System

Version and Release management issues.-Legacy Systems Structure and definitions-Legacy System Design- Legacy replacement strategies-Legacy System Assessment- Program evolution dynamics-Architectural evolution (n-tire) - Architectural evolution (VMC, SC, Web services)

9 Hours

Unit IV

Software Re- engineering & Reuse

The re- engineering Process definition -Reverse Engineering vs forward engineering - The re-engineering process structure- Software reusability definition-Software reuse and maintainability issues- Reusable components- Software Reengineering Strategies and Management.

9 Hours

Unit V

Design Patterns and maintainability issues

Design patterns and effects on software maintainability-A look at some design patterns under use-Open-source and maintainability issues- Frameworks and maintainability issues.

9 Hours

Unit VI[$]

Role of SQA for Support and Maintenance, Configuration Management and Maintenance, Global Maintenance Teams, Foundation of S3m Process Model, Exemplary Practices.

Total: 45 Hours

Reference(s)

1. Sommerville, Ian , *Software Engineering*, Addison Wesley, 2006.
2. Grubb P., Takang A A., *Software Maintenance- Concepts and Practice*, 2nd Eds, World Scientific, 2007.
3. Carma McClure ,*The Three R's of Software Automation ,Re-engineering , Repository, Reliability*, Prentice Hall, 1992.
4. Roger S. Pressman, *Software Engineering: A Practitioner's Approach*, 6th edition, McGraw Hill, 2005.

15SE64 SOFTWARE PROCESS MATURITY MODELS

3 0 0 3

Course Objectives

Demonstrate the Software Process models for the Adaptive development of Software Knowing the process improvement for the product quality improvement.

- To categorizes and examines a number of methods for describing or modeling how software systems are developed.
- Knowing the software life cycle
- Contemporary models of software development must account for software the interrelationships between software products and production processes, as well as for the roles played by tools, people and their workplaces

Course Outcomes (COs)

The Learning objective of this course is

1. To study the various software process maturity models
2. To study about how to assess software process
3. To know about the key process areas of the software process
4. To study about software improvement sequences

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Unit I

Introduction

Software Process - Software Maturity Framework – Software process Improvement – Process Maturity levels – Principles of Software process Change – Software Process Assessment

9 Hours

Unit II

CMM

CMM Introduction – CMM Maturity Levels - Initial process- Repeatable Process – Defined Process – Managed Process – Optimizing Process.

9 Hours

Unit III

CMMI

Evolution of CMMI – CMMI Framework – CMMI for Development – Capability level – Maturity levels – Case Study

9 Hours

Unit IV

TMM

Introduction to TMM – Structure of the TMM – Components of TMMI – Generic Goals and Generic Practices – Process areas for Generic practices –TMMI Maturity Levels – Initial – Managed – Defined – Management and Measurement – Optimization.

9 Hours

Unit V

Agile Maturity Model

Agile Software Development – Process Improvement framework for Agile Software Development – Initial Level – Explored Level – Defined level – Improved Level – Sustained Level - Software Process Improvement for Agile Software Development Practices.

9 Hours

Unit VI[$]

General Motors Implementation of CMMI for acquisition - Implementation by a leading Telecom giant to improve the quality of entire software development process

Total: 45 Hours

Reference(s)

1. Watts S. Humphrey, *Managing the Software process*, Pearson education,2008.
2. Marry Beth Chrissis, Mike Konnard, Sandy Shrum, *CMMI : guidelines for Process Integration and Product Improvement*, Addison Wesley, 3rd Edition,2011
3. Mark. C. Paulk, *CMM: Guidelines for Improving the Software Process*, 2011

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

15SE65 BIG DATA ANALYTICS

3 0 0 3

Course Objectives

- To study about Big Data Analytics with the help of cloud resource fundamentals.
- To develop cloud data systems are secure and dynamic in data transfer.
- To analyze the graph modeling and analytics of operation in data mining methods.

Course Outcomes (COs)

1. Students will be competent to analysis the data patterns that helps make decisions about how to improve at the industry and institutional level.
2. Students will be able to identify and develop data analysis that helps improve team practices in distributed cloud services environment.

Unit I

Introduction

Introduction to Big Data Analytics - Cloud Resource Fundamentals - Cloud & Big Data Overview - Cloud Storage - Cloud Data Transfer - Hadoop - DBs in the Cloud.

9 Hours

Unit II

Cloud Data Systems

Cloud DBs - Overview of SQL and intro to R DBs - Using R for Initial Analysis of the Data - Relational Storage Models - Data Sharing Incentives and Markets - Key Value Stores - In-Memory Data Systems - Data Transfer - Security: Data Protection, models - Data Consistency and Availability in the Cloud.

9 Hours

Unit III

Graphical Models

Pipelines and Graphs - Parallel programming environment - Graphical Models - Graph structure learning - Graph mining - Graph modeling - Time series analysis. Cluster Sizing for Data - intensive Analytics - Advanced Analytics and Statistical Modeling for Big Data : Theory and Methods - Statistical Modeling for Big Data: Technology and Tools.

9 Hours

Unit IV

Operationalizing Analytics

Massive Data Analytics: parallel algorithms - online learning algorithms - locality sensitive hashing - Big Data Analytics Lifecycle - Programming Abstractions: MR, Dryad, Pipelines, Graphs, Iteration - Cloud Storage - Classic Systems - intensive cloud applications - data confidentiality - In-Memory Data Storage - Cloud Data Privacy and Security.

9 Hours

Unit V

Cloud Case Studies

Team practices statistical learning - data mining techniques & process of data analytics - troubleshoot massive data analytics algorithms - Finding a needle in Haystack: facebook's photo storage - Volley: Automated Data Placement for Geo-Distributed Cloud Services - Scaling the mobile millennium system in the cloud.

9 Hours

Unit VI[$]

Characteristics of Bigdata, Phases of bigdata analytics, Applications, research areas.

Total: 45 Hours

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Reference(s)

1. Noreen Burlingame, *The Little Book of BIG DATA*, Kindle Edition, New Street Communications, LLC, 2012.
2. Arvind Sathi, *Big Data Analytics: Disruptive Technologies for Changing the Game*, Kindle Edition, Mc Press,2012.
3. C. Bishop, *Pattern Recognition and Machine Learning*, Springer 2007.
4. Trevor Hastie, Robert Tibshirani, Jerome. H. Friedman, *The elements of statistical learning: data mining, inference and prediction*, Springer, 2009.
5. http://www-stat-class.stanford.edu/~tibs/ElemStatLearn/
6. http://www.cs.ucsb.edu/~sudipto/papers/socc10-das.pdf
7. http://www.cs.ucsb.edu/research/tech_reports/reports/2010-04.pdf
8. http://www-users.cselabs.umn.edu/classes/Fall-2012/csci8980-2/
9. http://deesha-cloudviews.blogspot.in/

15SE66 INFORMATION RETRIEVAL TECHNIQUES

3 0 0 3

Course Objectives

- To understand the basics of Information Retrieval with pertinence to modeling, query operations and indexing
- To get an understanding of machine learning techniques for text classification and clustering
- To understand the various applications of Information Retrieval giving emphasis to Multimedia IR, Web Search
- To understand the concepts of digital libraries

Course Outcomes (COs)

1. Build an Information Retrieval system using the available tools
2. Identify and design the various components of an Information Retrieval system
3. Apply machine learning techniques to text classification and clustering which is used for efficient Information Retrieval Analyze the Web content structure
   Design an efficient search engine

Unit I

Introduction

Motivation – Basic Concepts – Practical Issues - Retrieval Process – Architecture – Boolean Retrieval –Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics–The impact of the web on IR —IR Versus Web Search–Components of a Search engine

8 Hours

Unit II

Modeling

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model - Term Weighting –Scoring and Ranking –Language Models – Set Theoretic Models - Probabilistic Models –Algebraic Models – Structured Text Retrieval Models – Models for Browsing

10 Hours

Unit III

Metrics

Experimental Evaluation of IR - Performance Metrics – Recall - Precision and F Measure - Evaluations on Benchmark Text Collections - Text Representation - Word Statistics - Zipf's Law - Porter Stemmer – Morphology - Index Term Selection - Using Thesauri - Metadata and Markup Languages - Web Search - Search Engines – Spidering – Metacrawlers - Directed Spidering – Link Analysis Shopping Agents.

9 Hours

Unit IV

Classification and Clustering

Text Classification and Naïve Bayes – Vector Space Classification – Support vector machines and Machine learning on documents. Flat Clustering – Hierarchical Clustering –Matrix decompositions and latent semantic indexing – Fusion and Meta learning

8 Hours

Unit V

Searching and Ranking

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking - Web Crawling and Indexing – Link Analysis - XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries

10 Hours

Unit VI[$]

Recommender Systems - Collaborative Filtering and Content-Based Recommendation of Documents and Products Information Extraction and Integration - Extracting Data from Text – XML - Semantic Web - Collecting and Integrating Specialized Information on the Web.

Total: 45 Hours

Reference(s)

1. Ricardo Baeza – Yates, Berthier Ribeiro – Neto, *Modern Information Retrieval: The concepts and Technology behind Search (ACM Press Books)*, Second Edition 2011
2. Christopher D. Manning, Prabhakar Raghavan, Hinrich Schutze, *Introduction to Information Retrieval*, Cambridge University Press, First South Asian Edition 2012
3. Stefan Buttcher, Charles L. A. Clarke, Gordon V. Cormack, *Information Retrieval Implementing and Evaluating Search Engines*, The MIT Press, Cambridge, Massachusetts London, England, 2010

15SE67 BIO-INFORMATICS

3 0 0 3

Course Objectives

- To study about the concepts of genomics and proteomics
- Utilize various bioinformatics tools
- Code solutions to bioinformatics problems utilizing tools
- Perform research in bioinformatics

Course Outcomes (COs)

1. Student will be able to understand the concepts of Bioinformatics Technology
2. Enables the students to use various bioinformatics tools
3. Able to analyze the Biological Data

Unit I

Introduction

Historical overview-Bioinformatics Applications- Data format and processing-Major databases-Data management- Data analysis, molecular biology -Tools for Web Search- Structural bioinformatics.

9 Hours

Unit II

Biological Databases

Biological databases- Primary & Secondary databases- Introduction to nucleotide sequence databases (Genbank, EMBL, DDBJ) RefSeq at NCBI, Protein Sequence databases- PIR,

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

Swissprot, UniProt, Other databases of importance: EGG, Protein structure database- PDB Nucleic acid & Protein sequence data formats: Flat file, GenBank, GenPept, FASTA.

9 Hours

Unit III

Pair wise Sequence Alignments

Introduction to Sequence alignment: Dotplot: advantages & disadvantages, Pairwise alignments: Local and Global alignment concepts, concepts of Gap penalty, Substitution matrices, Scoring matrices – PAM and BLOSUM. Dynamic programming methodology: Needleman and Wunsch algorithm. Smith –Waterman algorithm, Database search using FASTA and BLAST programs.

9 Hours

Unit IV

Phylogeny Analysis

Multiple sequence alignment, Progressive alignment- Tools for MSA – Sum of Pairs, Star Alignment, Tree alignment method Clustal) , Automated tools (ClustalW, T-Coffee),motifs and profile, Application (PSI-BLAST), Introduction to molecular phylogenetics (node, branch, OUT etc) Phylogenetics- Tree construction- Methods for phylogenetic analysis- Distance Matrix Method(MD), Neighbour Joining Method(NJ), Ftich-Margoliash method, Character based methods- Maximum Parsimony (MP), Maximum Likelihood (ML)

9 Hours

Unit V

Pattern Matching and Visualization

Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences .

9 Hours

Unit VI[$]

Nucleotide Pattern Matching, Polypeptide pattern matching, Drug Discovery, Issues, Protein structure, AbInitio Methods

Total: 45 Hours

Reference(s)

1. Teresa Attwood, David J.Parry-Smith, Dr.Samiron Phukan, *Introduction to Bioinformatics*, Pearson Education, 2007.
2. Yi-Ping Phoebe Chen, *Bioinformatics Technologies*, Springer Verlag, 2007.
3. JinXiong, *Essential Bioinformatics*, Cambridge University Press, 1st edition, 2006.
4. D. W. Mount, *Bioinformatics: Sequence and Genome Analysis*, CBS Publishers, 2004.
5. Baxevanis &Outlette , *Bioinformatics: A practical guide to the analysis of genes & proteins*, 3 rd edition, John Wiley & sons,2004.

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

15SE68 INFORMATION SECURITY

3 0 0 3

Course Objectives

- To know the concepts and definitions of the information security
- To understand various types of symmetric and asymmetric cryptographic algorithms
- To obtain the knowledge on Message Digest Algorithm in-depth and understand web security concepts and system level security

Course Outcomes (COs)

By the end of the course students will

1. Define the concepts and definition of the information security.
2. Differentiate several types of symmetric and asymmetric cryptographic algorithms.
3. Know Message Digest Algorithm in-depth and use it in various applications.
4. Understand web security concepts and system level security.

Unit I

Overview and Symmetric Ciphers

Computer Security Concepts, OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, Model for Network Security, Classical Encryption Techniques, Block Ciphers and the Data Encryption Standard, Advanced Encryption Standard, Block Cipher Operation.

9 Hours

Unit II

Asymmetric Ciphers

Number Theory, Prime Numbers, Fermats and Eulers Theorems, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms, Public-Key Cryptography and RSA Algorithm, Diffie-Hellman Key Exchange, ElGamal Cryptosystem, Elliptic Curve Cryptography.

9 Hours

Unit III

Cryptographic Data Integrity Algorithms

Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA), Message Authentication Codes, Message Authentication Requirements, Message Authentication Functions, Security of MACs, HMAC, Digital Signatures, Digital Signature Standard (DSS).

9 Hours

Unit IV

Mutual Trust, Network and Internet Security

Key Management and Distribution, X.509 Certificates, User Authentication Protocols Kerberos, Transport-Level Security, Secure Sockets Layer (SSL), Transport Layer Security (TLS), IEEE 802.11i Wireless LAN Security, Electronic Mail Security, Pretty Good Privacy (PGP), S/MIME, IP Security Overview, Encapsulating Security Payload, Combining Security Associations.

9 Hours

Unit V

System Security

Intruders, Intrusion Detection, Password Management, Types of Malicious Software Viruses, Worms, Distributed Denial of Service Attacks, Firewalls, Types of Firewalls, Firewall Location and Configurations, Cybercrime and Computer Crime, Intellectual Property, Privacy, Ethical Issues, ethical hacking.

9 Hours

Unit VI[$]

Security violations in symmetric ciphers, Elliptic curve Cryptosystem and Discrete Logarithm Problem, Advanced Secure Hash Algorithms and Digital Certificates, Wireless LAN Security and Advanced Network Security Algorithms, Firewalls and Ethical Hacking

Total: 45 Hours

Reference(s)

1. William Stallings, *Cryptography and Network Security: Principles and Practice*, Prentice Hall, Fifth Edition, 2012.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, *Network Security*, Prentice Hall, 2010.
3. Atul Kahate, *Cryptography and Network Security*, Tata McGraw Hill, 2012.

15SE69 JAVA PROGRAMMING

3 0 0 3

Course Outcomes (COs)

- To introduce the building blocks of the Java Language to the students
- To understand the various object oriented programming concepts
- To enable the students build applications based on Java

Course Outcomes (COs)

1. Induces the basic knowledge on Java Programming and its building blocks with their interoperability among various other domains
2. Enhances the use of programming paradigms in the real time environment with practical knowledge on various component technologies evolving in the market
3. Enables the students to build a management system that can be used in any real time applications with greater functionality

Unit I

Introduction to Java

Basics of Java, Background/History of Java, Java and the Internet, Advantages of Java - Java Virtual Machine & Byte Code-Java Environment Setup- Java Program Structure-Procedure-Oriented vs. Object-Oriented Programming concept-Abstraction, Inheritance, Encapsulation, Classes, subclasses and super classes, Polymorphism and Overloading, message communication

9 Hours

Unit II

Building Blocks

Primitive Data Types: Integers, Floating Point type, Characters, Booleans etc -User Defined Data Type- Identifiers & Literals -Declarations of constants & variables -Type Conversion and Casting - Scope of variables & default values of variables declared - Wrapper classes- Comment Syntax-Garbage Collection-Arrays of Primitive Data Types - Types of Arrays-Different Operators-Decision & Control Statements

9 Hours

Unit III

Inheritance, Packages & Interfaces

Basics of Inheritance, Types of inheritance: single, multiple, multilevel, hierarchical and hybrid inheritance, concepts of method overriding, extending class, super class, subclass, dynamic method dispatch & Object class-Creating package, importing package, access rules for packages,

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

class hiding rules in a package-Defining interface, inheritance on interfaces, implementing interface, multiple inheritance using interface-Abstract class and final class

9 Hours

Unit IV

Exception Handling & Multithreaded Programming

Types of errors, exceptions, try..catch statement, multiple catch blocks, throw and throws keywords, finally clause, uses of exceptions, user defined exceptions-Creating thread, extending Thread class, implementing Runnable interface, life cycle of a thread, Thread priority & thread synchronization, exception handing in threads

9 Hours

Unit V

File Handling

Stream classes, class hierarchy, useful I/O classes, and creation of text file, reading and writing text files

9 Hours

Unit VI[$]

Introduction to the Apache Struts, Introduction to the Struts Controller, Introduction to the Struts Action Class, Introduction to Hibernate 3.0, First Hibernate Application

Total: 45 Hours

Reference(s)

1. Herbert Schildt, *Java: The Complete Reference*, Seventh Edition Tata McGraw Hill,2007
2. E Balagurusamy ,*Programming with Java*, Tata McGraw Hill, 4th edition, 2009
3. Cay S. Horstmann, Gray Cornell, *Core Java, Vol I Fundamentals Java Series*, Sun MicroSystem, 9th edition, 2012
4. Sachin Malhotra &Saurabh Choudhary, *Programming in JAVA*, Second Edition Oxford, Reprint 2013.

$ Includes Self Study topics of all 5 units and considered for Continuous Assessment only.

15SEXA MAYA

1 0 0 1

Course Objectives

- To understand Basic Graphical object designing and animation of those object using MAYA tool
- To prepare students to develop Animated cartoons in an interactive and attractive manner.

Course Outcomes (COs)

1. Students will be able to Create Human characters with their characteristics
2. Students will be able to Develop Animated Movies with their creativity.

Module 1

Maya Basic Modeling – Maya Interface – Creating objects using EP curve, CV curve – Making Table Lamp – Polygon Terminology, Polygon over view – Modeling a dice using Boolean – Making An Box using loft – Modeling some inorganic objects –Creating Terrain using sculpt geometry tool.

Module 2

B.G & Set Modeling – Creating Mountains – Interior & Exterior Modeling –Modeling a garden – Modeling a Landscape-Maya Character Modelling – Modeling the eyes, nose – Modeling the Leg of the Character – Modeling the body – Modeling a Female Character – Modeling a Male Character – Modeling a High Polygonal.

Module 3

Material assigning – Hyper Shade over view – Shades and Textures – Material Linking – Light linking to the materials – Mental Ray Shades – Mental Ray Textures –Image based Lighting Shades – Controlling Photon Emission from Shades. Character UV Texturing – UV Texturing over View – Applying Texture for Dice– Applying UV's for Inorganic Models – Applying UV's for head – Appbody – Applying UV's for B.G.

Total: 20 Hours

Reference(s)

1. Tom Meade and Shinsaku Arima, *Maya 6: The Complete Reference*, 1st Edition McGraw-Hill Osborne Media, 2004.
2. www.digitaltutors.com/Maya-Tutorial
3. http://accad.osu.edu/~aprice/courses/BVE/CharacterAnimationMaya Tutorial.pdf

15SEXB ANDROID APPLICATION DEVELOPMENT

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Course Objectives

- To understand the fundamentals of Mobile Applications
- To prepare students to design interactive Applications on Handheld devices

Course Outcomes (COs)

1. Students will be able to develop native Applications
2. Students will be able to deploy Mobile Applications on Handheld devices

Getting started with Mobile Application

AVD Creation - The Android Emulator-Building an Android Application in Eclipse – Debugging - Running app on Emulator - The Manifest File - Activity Life Cycle - Creating the Activity - An Overview of User Interfaces - Using XML Layouts

Animation Effects

Styles and Themes – Shapes - Notifications -PReference(s) – View - Layout - UI development in Android – Menus – working with audio and video - Image Switcher

Content Manipulation

Array Adapter - Base Adapter - SQLite Databases - Working with cursors, inserts, updates and deletes, Event Handling - Location based Services – Telephone operations- Sending and receiving SMS - working on HTTP protocol- Real time Project Demonstrations

Mini project

- Working on Animations.
- Develop application to create, modify and query on SQLite Databases

Total: 20 Hours

Reference(s)

1. Wei-Meng Lee, Inc. *Beginning Android 4 Application Development*, John Wiley and Sons, 2012.
2. www.androidhive.com
3. www.developer.android.com