CHRIST (Deemed to University), Bangalore

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHOOL OF ENGINEERING AND TECHNOLOGY

Syllabus for
Master of Technology (Computer Science and Engineering)
Academic Year (2022)

1 Semester - 2022 - Batch					
Course Code	Course	Type	Hours Per Week	Credits	Marks
MTAC121	ENGLISH FOR RESEARCH PAPER WRITING	Ability Enhancement Compulsory Course	2	2	0
MTCS112	PROFESSIONAL PRACTICE - I	Core Courses	2	1	50
MTCS131	ADVANCED ALGORITHMS	Core Courses	3	3	100
MTCS132	ADVANCED DIGITAL IMAGE PROCESSING	Core Courses	3	3	100
MTCS141E03	SOFTWARE PROJECT MANAGEMENT	Discipline Specific Elective	3	3	100
MTCS142E01	BIG DATA ANALYTICS	Discipline Specific Elective	3	3	100
MTCS151	ADVANCED ALGORITHMS LAB	Core Courses	2	2	50
MTCS152	ADVANCED DIGITAL IMAGE PROCESSING LAB	Core Courses	4	2	50
MTMC125	RESEARCH METHODOLOGY AND IPR	Ability Enhancement Compulsory Course	3	3	100
2 Semester - 2022 - Batch					
Course Code	Course	Type	Hours Per Week	Credits	Marks
MTCS211E03	STRESS MANAGEMENT BY YOGA	Ability Enhancement Compulsory Course	2	0	0
MTCS212	PROFESSIONAL PRACTICE-II	Core Courses	2	1	50
MTCS231	COMPUTER COMMUNICATION NETWORKS	Core Courses	3	3	100
MTCS232	DATA SCIENCE	Core Courses	3	3	100
MTCS243E01	CLOUD COMPUTING	Elective	3	3	100
MTCS244E01	INTERNET OF THINGS	Elective	3	3	100
MTCS251	NETWORKING LAB	Core Courses	4	2	50
MTCS252	DATA SCIENCE LAB	Core Courses	4	2	50

3 Semester - 2021 - Batch					
Course Code	Course	Type	Hours Per Week	Credits	Marks
MTCS345E10	WEB TECHNOLOGY	Discipline Specific Elective	3	3	100
MTCS381	INTERNSHIP	Core Courses	4	2	50
MTCS382	DISSERTATION PHASE - I	Core Courses	20	10	200
MTEC362	COMPRESSION AND ENCRYPTION TECHNIQUES	Core Courses	3	3	100
4 Semester - 2021 - Batch					
Course Code	Course	Type	Hours Per Week	Credits	Marks
MTCS483	DISSERTATION PHASE-II	Core Courses	32	16	200

Introduction to Program:

The 2 year Post graduate program M.Tech in Computer Science and Engineering.started in 2009 . The course was started mainly to cater to the increasing demand for higher studies in the country. A growing intake with students from across the nation shows the popularity of the program. The Department strives to give skills essential to practicing engineering professionals; it is also an objective to provide experience in leadership, management, planning, and organization. The department understands its role in developing and evaluating methods that encourage students to continue to learn after leaving the university. We believe that the student opportunities and experiences should lead to an appreciation of the holistic development of individual. We also try to pass to our students our passion for what we do, and to have the students comprehend that we also desire to continue to learn.

Programme Outcome/Programme Learning Goals/Programme Learning Outcome:

PO1: Scholarship of Knowledge

PO2: Critical Thinking

PO3: Problem Solving

PO4: Research Skill

PO5: Usage of modern tools

PO6: Collaborative and Multidisciplinary work

PO7: Project Management and Finance

PO8: Communication

PO9: Life-long Learning

PO10: Ethical Practices and Social Responsibility

Assesment Pattern

Components of the CIA

CIA I : Mid Semester Examination (Theory) : 25 marks

CIA II : Assignments : 10 marks

CIA III: Quizzes/Seminar/Case Studies/Project Work : 10 marks

Attendance : 05 marks

Total : 50 marks

For subjects having practical as part of the subject

End semester practical examination : 25 marks

Records : 05 marks

Mid semester examination : 10 marks

Class work : 10 marks

Total : 50 marks

Examination And Assesments

Assessment of each paper

· Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)

· End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

MTAC121 - ENGLISH FOR RESEARCH PAPER WRITING

(2022 Batch)

Total Teaching Hours for Semester:30 **No of Lecture Hours/Week:2**

Max Marks:0 **Credits:2**

Course Objectives/Course Description

Course description:

The course is designed to equip the necessary awareness and command on the use of English language in writing a research paper starting from how to compile an appropriate title, language to use at different stages of a paper to make it effective and meaningful.

Course objectives:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section.
- Understand the skills needed when writing a Title and ensure the good quality of paper at very first-time submission

Course Outcome

C01: Write research paper which will have higher level of readability

C02: Demonstrate what to write in each section

C03: To write appropriate Title for the research paper

CO4: Write concise abstract

C05: Write conclusions clearly explaining the outcome of the research work

Unit-1 **Teaching Hours:6**

Fundamentals of Research Paper

- Planning and Preparation
- Word Order & Breaking up long sentences
- Structuring Paragraphs and Sentences
- Being Concise and Removing Redundancy
- Avoiding Ambiguity and Vagueness.

Unit-2 **Teaching Hours:6**

Essentials of Research Paper & Abstract and Introduction

- Clarifying Who Did What
- Highlighting Your Findings
- Hedging and Criticizing
- Paraphrasing and Plagiarism
- Sections of a Paper
- Abstracts. Introduction

Unit-3 **Teaching Hours:6**

Body and Conclusion

- Review of the Literature
- Methods, Results
- Discussion
- Conclusions
- The Final Check

Unit-4 **Teaching Hours:6**

Key Skill for Writing Research Paper: Part 1

- Key skills for writing a Title, an Abstract, an Introduction.
- Review of Literature.

Unit-5 **Teaching Hours:6**

Key Skill for Writing Research Paper : Part 2

- Key skills for writing Methods, Results, Discussion, Conclusions
- Useful phrases to ensure the quality of the paper

Text Books And Reference Books:

Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books).

Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Essential Reading / Recommended Reading

Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press.

Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook.

Evaluation Pattern

As it is an audit course thre will be no graded evaluation.

Total Teaching Hours for Semester:32 **No of Lecture Hours/Week:2**

Max Marks:50 **Credits:1**

Course Objectives/Course Description

SUBJECT OBJECTIVE:

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews and intended to increase the score they earn on the upcoming exam above what they would otherwise earn.

This course is specially designed for the students of higher degree. It aims to train and equip the students towards acquiring competence in teaching, laboratory skills, research methodologies and other professional activities including ethics in the respective academic disciplines.

The course will broadly cover the following aspects: Teaching skills Laboratory skills and other professional activities Research methodology For teaching suitable courses where strengthening in the training of the students is required will be identified and the student will be asked to prepare lectures on selected topics pertaining to the courses and present these lectures before a panel of faculty members. The student will also be required to prepare question papers which will test the concepts, analytical abilities and grasp in the subject. Wherever the laboratories are involved, students will also be asked to carry out laboratory experiments and learn about the use and applications of the instruments. The general guiding principle is that the students should be able to teach and participate in the undergraduate degree courses in his/her discipline in an effective manner. The students will also assist the faculty in teaching and research activities. The course will also contain the component of research methodology, in which a broad topic will be assigned to each student and he/ she is supposed to carry out intensive literature survey, data analysis and prepare a research proposal.

Each group will carry out many professional activities beside teaching and research. Such as, purchase of equipments, hardware, software and planning for new experiments and also laboratories etc. Along with these the students will also be assigned some well defined activities. The student is expected to acquire knowledge of professional ethics in the discipline.

Course Outcome

CO 1: 1.To demonstrate the teaching abilities by black board and ICT technologies

CO 2: 2. To study the research directions in areas of Computer science and engineering

Unit-1 **Teaching Hours:32**

Teaching, Learning and Research Methodologoes

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models. This will enable them to gain confidence in facing the placement interviews and intended to increase the score they earn on the upcoming exam above what they would otherwise earn.

This course is specially designed for the students of higher degree. It aims to train and equip the students towards acquiring competence in teaching, laboratory skills, research methodologies and other professional activities including ethics in the respective academic disciplines.

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The student will also be required to prepare question papers which will test the concepts, analytical abilities and grasp in the subject. Wherever the laboratories are involved, students will also be asked to carry out laboratory experiments and learn about the use and applications of the instruments. The general guiding principle is that the students should be able to teach and participate in the undergraduate degree courses in his/her discipline in an effective manner. The students will also assist the faculty in teaching and research activities. The course will also contain the component of research methodology, in which a broad topic will be assigned to each student and he/ she is supposed to carry out intensive literature survey, data analysis and prepare a research proposal.

Each group will carry out many professional activities beside teaching and research. Such as, purchase of equipments, hardware, software and planning for new experiments and also laboratories etc. Along with these the students will also be assigned some well defined activities. The student is expected to acquire knowledge of professional ethics in the discipline.

Text Books And Reference Books:

Recent advances in Teaching, Learning and Research Methodologoes

Essential Reading / Recommended Reading

Newer versions of ICT Usage

Evaluation Pattern

Each student will present 3- 4 lectures, which will be attended by all other students and Instructors. These lectures will be evenly distributed over the entire semester. The coordinator will announce the schedule for the entire semester and fix suitable meeting time in the week.

Each student will also prepare one presentation about his findings on the broad topic of research. The final report has to be submitted in the form of a complete research proposal. The References and the bibliography should be cited in a standard format. The research proposal should contain a) Topic of research b) Background and current status of the research work in the area as evident from the literature review c) Scope of the proposed work d) Methodology e) References and bibliography.

A report covering laboratory experiments, developmental activities and code of professional conduct and ethics in discipline has to be submitted by individual student.

The panel will jointly evaluate all the components of the course throughout the semester and the mid semester grade will be announced by the respective instructor to his student.

A comprehensive viva/test will be conducted at the end of the semester jointly, wherever feasible by all the panels in a particular academic discipline/department, in which integration of knowledge attained through various courses will be tested and evaluated.

MTCS131 - ADVANCED ALGORITHMS (2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

To learn the systematic way of solving problems.

To understand the different methods of organizing large amounts of data.

To efficiently implement the different data structures.

To efficiently implement solutions for specific problems

Course Outcome

CO1: Summarize the properties of advanced data structures.

CO2: Design algorithms and employ appropriate advanced data structures for solving computing problems efficiently.

CO3: Analyze and compare the efficiency of algorithms.

CO4: Design and implement efficient algorithms for solving computing problems in a high-level object-oriented programming language.

CO5: Compare, contrast, and apply algorithmic trade-offs : time vs. space, deterministic vs. randomized, and exact vs. approximate

Unit-1 **Teaching Hours:9**

INTRODUCTION

Review of Analysis Techniques: Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method; Amortized Analysis: Aggregate, Accounting and Potential Methods.

Unit-2 **Teaching Hours:9**

GRAPH ALGORITHMS AND POLYNOMIALS

Graph Algorithms: Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford -Fulkerson method; Maximum bipartite matching.

Polynomials and the FFT: Representation of polynomials; The DFT and FFT; Efficient implementation of FFT.

Unit-3 **Teaching Hours:9**

NUMBER THEORETIC ALGORITHMS

Number -Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem; Powers of an element; RSA cryptosystem; Primality testing; Integer factorization

Unit-4 **Teaching Hours:9**

STRING MATCHING ALGORITHMS

String-Matching Algorithms: Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata; Knuth-Morris-Pratt algorithm; Boyer – Moore algorithms.

Unit-5 **Teaching Hours:9**

PROBABILISTIC ALGORITHMS

Probabilistic and Randomized Algorithms: Probabilistic algorithms; Randomizing deterministic algorithms, Monte Carlo and Las Vegas algorithms; Probabilistic numeric algorithms.

Case Study: Comparison of Algorithm Design Strategies based on CPU, Memory, Disk and Network usages.

Text Books And Reference Books:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: "Introduction to Algorithms", 3rd Edition, The MIT Press, 2014.
2. Kenneth A. Berman, Jerome L. Paul: "Algorithms", Cengage Learning, 2013.

Essential Reading / Recommended Reading

1. Horowitz, Sahni, Rajasekaran, "Computer Algorithms", University press 2008
2. Tanenbaum A.S., Langram Y, Augestien M.J., "Data Structures using Java", Prentice Hall of India, 2009
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in Java", 3rd edition,Pearson Education, 2012.
4. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education, 2009.

Evaluation Pattern

Assessment of each paper

- Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)
- End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

Components of the CIA

CIA I : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

CIA II : Mid Semester Examination (Theory) : 25 marks

CIA III : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

Attendance : 05 marks

Total : 50 marks

MTCS132 - ADVANCED DIGITAL IMAGE PROCESSING (2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

The students will learn the fundamental concepts of Image Processing.

The students will learn image enhancement techniques in the spatial & frequency domains

The students will learn the restoration & compression models.

Help the students with segmentation and representation techniques for the region of interest.

The students will learn how to recognize objects using pattern recognition techniques

Course Outcome

CO1: Ability to apply the image fundamentals and mathematical transformations necessary for image processing

CO2: Ability to analyze image enhancement techniques in Spatial &frequency domain

CO3: Ability to apply restoration models and compression models for image processing

CO4: Ability to synthesis image using segmentation and representation techniques

CO5: Ability to analyze and extract potential features of interest from the image

CO6: Ability to design object recognition systems using pattern recognition techniques

Unit-1 **Teaching Hours:9**

DIGITAL IMAGE FUNDAMENTALS

Image formation, Image transforms – Fourier transforms, Walsh, Hadamard, Discrete cosine, Hotelling transforms

Unit-2 **Teaching Hours:9**

IMAGE ENHANCEMENT & RESTORATION

Histogram modification techniques - Image smoothening - Image Sharpening - Image Restoration - Degradation Model – Noise models - Spatial filtering – Frequency domain filtering

Unit-3 **Teaching Hours:9**

IMAGE COMPRESSION & SEGMENTATION

Compression Models - Elements of information theory - Error free Compression - Image segmentation –Detection of discontinuities – Region based segmentation – Morphology

Unit-4 **Teaching Hours:9**

REPRESENTATION AND DESCRIPTION

Representation schemes- Boundary descriptors- Regional descriptors - Relational Descriptors

Unit-5 **Teaching Hours:9**

OBJECT RECOGNITION ANDINTERPRETATION

Patterns and pattern classes - Decision-Theoretic methods - Structural methods-Case studies

Text Books And Reference Books:

1. Gonzalez.R.C& Woods. R.E., "Digital Image Processing", 3rd Edition, Pearson Education, Indian edition published by Dorling Kindersely India Pvt. Ltd. Copyright © 2009, Third impression 2011.

2. Gonzalez.R.C& Woods. R.E., "Digital Image Processing using MATLAB", 2nd Edition, McGraw Hill Education (India) Pvt Ltd 2011 (Asia)

3. Madan, " An Introduction to MATLAB for Behavioural Researchers", Sage Publications, 2014

Essential Reading / Recommended Reading

1. Madan, " An Introduction to MATLAB for Behavioural Researchers", Sage Publications, 2014

Evaluation Pattern

Assessment of each paper

- Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)
- End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

MTCS141E03 - SOFTWARE PROJECT MANAGEMENT (2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

Course Description and Course Objectives

The main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal. models are required for determining target values and for

continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects. Assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management). The goals of the course can be characterized as follows.

• Understanding the specific roles within a software organization as related to project and process management

• Understanding the basic infrastructure competences (e.g., process modeling and measurement)

• Understanding the basic steps of project planning, project management. Quality assurance, and process management and their relationships.

Course Outcome

CO1: Understanding the specific roles within a Conventional Software Management organization as related to project

CO2: Describe and determine the purpose and importance of project management from the perspectives of planning, cost, tracking and completion of project.

C03: Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities.

CO4: Implement a project to manage project schedule, expenses and resources with the application of suitable protect management tools.

CO5: Identify the resources required for a project and to produce a work plan and resource Schedule

CO6: Compare and differentiate organization structures and project structures.

Unit-1 **Teaching Hours:9**

Conventional Software Management

The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics. Pragmatic software cost estimation.

Unit-2 **Teaching Hours:9**

Unit 2

Improving Software Economics

Reducing Software product size, Improving software processes, improving team effectiveness. Improving automation, Achieving required quality, peer inspections. The old way and the new- The principles of conventional software engineering. Principles of modem software management, transitioning to an iterative Process.

Unit-3 **Teaching Hours:9**

Unit 3

Life cycle phases

Engineering and production stages, inception. Elaboration, construction, transition phases. Artifacts of the process: The artifact sets. Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

Unit-4 **Teaching Hours:9**

Unit 4

Work Flows of the process

Software process workflow, Inter trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning Work breakdown structures, planning guidelines, cost and scheduled estimating, Interaction, planning process, pragmatic Planning.

Unit-5 **Teaching Hours:9**

Unit 5

Project Control and Process instrumentation

The server care Metrics, Management indicators, and quality indicators. Life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates, Example.

Future Software Project Management: Modem Project Profiles Next generation Software economics modem Process transitions.

Case Study: The Command Center Processing and Display System. Replacement (CCPDS. R).

Text Books And Reference Books:

Essential References

Text Books

1. Software Project Management. Walker Royce, Pearson Education 2010.

2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tate McGraw HD 2012.

Essential Reading / Recommended Reading

Recommended References

Reference Books

1. Applied Software Project Management, Andrew StelbianSt Jennifer Greene, O'Reilly. 2006

2. Head First PMP, Jennifer Greene & Andrew Steliman, ORoiHy.2007

3. Software Enneeñng Project Managent. Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.

4. Ale Project Management, Jim Highsniith. Pearson education, 2004

5. The art of Project management. Scott Berkun. O'Reilly, 2005.

6. Software Project Management in Practice. PankajJalote. Pearson Educabon,2002.

7. SEI.CMMI Tutorial, ww.sei.cmu.edu/cmmi/publications/stc.presentations/tutorial.html

Evaluation Pattern

Evaluation Pattern

Continuous Internal Assessment 50% .

End Semester Examination 50%

MTCS142E01 - BIG DATA ANALYTICS (2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

To Understand big data for business intelligence

To Learn business case studies for big data analytics

To Understand Nosql big data management

To manage Big data without SQL

To understanding map-reduce analytics using Hadoop and related tools

Course Outcome

CO1: Describe big data and use cases from selected business domains. (L1)

CO2: Discuss open source technologies. (L2)

CO3: Explain NoSQL big data management. (L2)

CO4: Discuss basics of Hadoop and HDFS. (L2)

CO5: Discuss map-reduce analytics using Hadoop and related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics. (L3)

Unit-1 **Teaching Hours:9**

UNDERSTANDING BIG DATA

What is big data – why big data –.Data!, Data Storage and Analysis, Comparison with Other Systems, Rational Database Management System , Grid Computing, Volunteer Computing, convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data– big data technologies – introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics.

Unit-2 **Teaching Hours:9**

NOSQL DATA MANAGEMENT

Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models – relationships –graph databases – schema less databases – materialized views – distribution models – sharding –– version – Map reduce –partitioning and combining – composing map-reduce calculations

Unit-3 **Teaching Hours:9**

BASICS OF HADOOP

Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes – design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow – Hadoop I/O – data integrity – compression – serialization – Avro – file-based data structures

Unit-4 **Teaching Hours:9**

MAPREDUCE APPLICATIONS

MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution –MapReduce types – input formats – output formats

Unit-5 **Teaching Hours:9**

HADOOP RELATED TOOLS

Hbase – data model and implementations – Hbase clients – Hbase examples –praxis. Cassandra – Cassandra data model –cassandra examples – cassandra clients –Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation –HiveQL queries-case study.

Text Books And Reference Books:

1. 1. Tom White, "Hadoop: The Definitive Guide", 4th Edition, O'Reilley, 2012.

2. Eric Sammer, "Hadoop Operations",1st Edition, O'Reilley, 2012.

Essential Reading / Recommended Reading

1. 1. VigneshPrajapati, Big data analytics with R and Hadoop, SPD 2013.
2. 2. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.
3. 3. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.

4. Alan Gates, "Programming Pig", O'Reilley, 2011.

Evaluation Pattern

Continuous Internal Assessment: 50 marks .

End Semester Examination: 50 marks

Total Teaching Hours for Semester:30 **No of Lecture Hours/Week:2**

Max Marks:50 **Credits:2**

Course Objectives/Course Description

- To increase the knowledge of advanced paradigms of algorithm design.
- To make the students learn an object oriented way of solving problems.
- To Enhance students' capability of selecting the best and efficient way for encoding problems.

Course Outcome

CO1: Make use of mathematical techniques to construct robust algorithms. (L3)

CO2: Assess and to make critical judgment on the choices of algorithms for modern computer systems. (L4)

CO3: To demonstrate the knowledge retrieved through solving problems through a mini project. (L4)

Unit-1 **Teaching Hours:6**

List of Experiments on Algorithms Analysis

1. Implementation of Sorting Techniques like Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort and Heap Sort and Compare their performances.
2. Implementation of Linear Search and Binary Search Algorithms and Compare their performances.
3. Mini Project Details: Selection of Topic and Research about the Selected Topic.

Unit-2 **Teaching Hours:6**

List of Experiments on Graph Algorithms

1. Implementation of Shortest Path Algorithm (Bellman Ford).
2. Implementation of Single Source Shortest Path in a DAG using Dijkstra's Algorithm.
3. Mini Project Details: Choosing the right Dataset for the chosen Title/Topic and Exploratory Data Analysis (EDA).

Unit-3 **Teaching Hours:6**

List of Experiments on Number Theoretic Algorithms

1. Implement Chinese Remainder Theorem Algorithm.
2. Implement RSA Public-Key Cryptosystem.
3. Mini Project Details: Implementation (2 Phases) - Phase 1

Unit-4 **Teaching Hours:6**

List of Experiments on String Matching Algorithms

1. Design, develop, and write a program to solve String Matching Problem using naïve approach, the KMP and Robin Karp algorithm. Compare their performances.
2. Mini Project Details: Implementation (2 Phases) - Phase 2

Unit-5 **Teaching Hours:6**

List of Experiments on Randomized Algorithms

1. Design, develop, and write a program to implement a Monte Carlo algorithm to test the primality of a given integer and determine its performance.
2. Implement any Las Vegas Algorithm used for Randomization.
3. Mini Project Details: Performance Analysis and Report Submission

Text Books And Reference Books:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: “Introduction to Algorithms”, 3rd Edition, The MIT Press, 2014.
2. Kenneth A. Berman, Jerome L. Paul: “Algorithms”, Cengage Learning, 2013.

Essential Reading / Recommended Reading

1. Horowitz, Sahni, Rajasekaran, “Computer Algorithms”, University press 2008
2. Tanenbaum A.S., Langram Y, Augestien M.J., ”Data Structures using Java”, Prentice Hall of India, 2009
3. Mark Allen Weiss, “Data Structures and Algorithm Analysis in Java”, 3rd edition, Pearson Education, 2012.
4. Aho, Hopcroft, Ullman, “Data Structures and Algorithms”, Pearson Education, 2009.

Evaluation Pattern

End semester practical examination: 25 marks

Records: 05 marks

Mid semester examination: 10 marks

Class work: 10 marks

Total: 50 marks

MTCS152 - ADVANCED DIGITAL IMAGE PROCESSING LAB (2022 Batch)

Total Teaching Hours for Semester:60 **No of Lecture Hours/Week:4**

Max Marks:50 **Credits:2**

Course Objectives/Course Description

Students are expected to implement the image processing algorithms and techniques to solve the real life problems.

Course Outcome

CO1: Examine the principles and techniques of digital image processing in applications related to digital imaging system design and analysis

CO2: Experiment and implement image processing algorithms

CO3: Understand software tools for processing digital images

CO4: Experiment image processing problems and techniques

CO5: Examine image processing algorithms on computers

CO6: Demonstrate algorithms to solve image processing problems

Unit-1 **Teaching Hours:12**

unit 1

1. Display of Grayscale Images,

Unit-2 **Teaching Hours:12**

Unit-2

1 . Implementation of various transforms and their use.

2. Implementation of Histogram Equalization, Non-linear Filtering.

Unit-3 **Teaching Hours:12**

Unit-3

1.Implementation of Edge detection using Operators, 2-D DFT and DCT.

2. Implementation of Filtering in frequency domain

Unit-4 **Teaching Hours:12**

Unit-4

1. Implementation of Segmentation using various transform.

Unit-5 **Teaching Hours:12**

Unit-5

1. Implementation of various Morphological algorithms.

2. Implementation of IEEE/ACM paper in the Digital image processing area

Text Books And Reference Books:

1. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, "Digital Image Processing using MATLAB", Pearson Education, Inc., 2004.

2. Gonzalez.R.C & Woods. R.E., "Digital Image Processing using MATLAB", 2nd Edition, McGraw Hill Education (India) Pvt Ltd 2011 (Asia)

3. Madan, " An Introduction to MATLAB for Behavioural Researchers", Sage Publications, 2014

Essential Reading / Recommended Reading

1. David A Forsyth & Jean ponce "Computer Vision: A Modern Approach" 2nd Edition, Pearson Education India 2015.

Evaluation Pattern

End semester practical examination	: 25 marks
Records	: 05 marks
Mid semester examination	: 10 marks
Class work	: 10 marks
Total	**: 50 marks**

MTMC125 - RESEARCH METHODOLOGY AND IPR (2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

The aim of the course is to introduce the research methodology, the understanding on the research, methods, designs, data collection methods, report writing styles and various dos and don'ts in research.

Course Outcome

CO1: Explain the principles and concepts of research methodology.

CO2: Understand the different methods of data collection.

CO3: Apply appropriate method of data collection and analyze using statistical/software tools.

CO4: Present research output in a structured report as per the technical and ethical standards.

CO5: Create research design for a given engineering and management problem /situation.

Unit-1 **Teaching Hours:9**

INTRODUCTION TO RESEARCH METHODOLOGY

Meaning, Objectives and Characteristics of research - Research methods Vs Methodology, Different Research Design: Types of research - Descriptive Vs.

Analytical, Applied Vs. Fundamental, Quantitative Vs. Qualitative, Conceptual Vs. Empirical, Research process - Criteria of good research - Developing a research plan.

Unit-2 **Teaching Hours:9**

LITERATURE REVIEW AND RESEARCH PROBLEM IDENTIFICATION

Defining the research problem - Selecting the problem - Necessity of defining the problem - Techniques involved in defining the problem - Importance of literature review in defining a problem - Survey of literature - Primary and secondary sources - Reviews, treatise, monographs, thesis reports, patents - web as a source - searching the web - Identifying gap areas from literature review - Development of working hypothesis.

Unit-3 **Teaching Hours:9**

DATA COLLECTION & ANALYSIS

Selection of Appropriate Data Collection Method: Collection of Primary Data, Observation Method, Interview Method, Email, Collection of Data through Questionnaires, Collection of Data through Schedules, Collection of Secondary Data – internal & external. Sampling process: Direct & Indirect Methods, Non-probability sampling, Probability sampling: simple random sampling, systematic sampling, stratified sampling, cluster sampling, Determination of sample size; Analysis of data using different software tools.

Unit-4 **Teaching Hours:9**

RESEARCH PROBLEM SOLVING

Processing Operations, Types of Analysis, Statistics in Research, Measures of: Central Tendency, Dispersion, Asymmetry and Relationship, correlation and regression, Testing of Hypotheses for single sampling: Parametric (t, z and F), Chi Square, Logistic regression, ANOVA, non-parametric tests. Numerical problems.

Unit-5 **Teaching Hours:9**

IPR AND RESEARCH WRITING

IPR: Invention and Creativity- Intellectual Property-Importance and Protection of Intellectual Property Rights (IPRs)- A brief summary of: Patents, Copyrights, Trademarks, Industrial Designs; Publication ethics, Plagiarism check.

Research Writing: Interpretation and report writing, Techniques of interpretation, Types of report – letters, articles, magazines, transactions, journals, conferences, technical reports, monographs and thesis; Structure and components of scientific writing: Paragraph writing, research proposal writing, reference writing, summarizing and paraphrasing, essay writing; Different steps in the preparation - Layout, structure and language of the report – Illustrations, figures, equations and tables.

Text Books And Reference Books:

T1. Kothari C.R., “Research Methodology Methods and techniques”, New Age International, New Delhi, 2004.

T2. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, “An introduction to Research Methodology”, RBSA Publishers, 2002.

T3. Day, R.A., “How to Write and Publish a Scientific Paper”, Cambridge University Press, 1992.

Essential Reading / Recommended Reading

R1. Bjorn Gustavii, “How to Write and Illustrate Scientific Papers “ Cambridge University Press, 2/e.

R2. Sarah J Tracy, “Qualitative Research Methods” Wiley Balckwell- John wiley & sons, 1/e, 2013.

R3. James Hartley, "Academic Writing and Publishing", Routledge Pub., 2008.

Evaluation Pattern

Continuous Internal Assessment - 50%

End Semester Examination - 50%

MTCS211E03 - STRESS MANAGEMENT BY YOGA (2022 Batch)

Total Teaching Hours for Semester:30 **No of Lecture Hours/Week:2**

Max Marks:0 **Credits:0**

Course Objectives/Course Description

To achieve overall health of body and mind

To overcome stress

Course Outcome

CO1: Explain the effectiveness of stress management techniques through Yoga.

CO2: Apply various Yoga Techniques.

CO3: Assess and analyze the symptoms, causes and effects of personal and academic stressors in order to implement appropriate stress management techniques.

Unit-1 **Teaching Hours:8**

Unit-1

Definitions of Eight parts of yog. (Ashtanga)

Unit-2 **Teaching Hours:8**

unit-2

Yam and Niyam. Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit-3 **Teaching Hours:8**

Unit-3

Asan and Pranayam i) Various yog poses and their benefits for mind & body ii)Regularization of breathing techniques and its effects-Types of pranayam

Text Books And Reference Books:

Yogic Asanas for Group Tarining-Part-I" :Janardan Swami YogabhyasiMandal, Nagpur

Essential Reading / Recommended Reading

"Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

Evaluation Pattern

NA

MTCS212 - PROFESSIONAL PRACTICE-II (2022 Batch)

Total Teaching Hours for Semester:30 **No of Lecture Hours/Week:2**

Max Marks:50 **Credits:1**

Course Objectives/Course Description

Duringtheseminarsessioneachstudentisexpectedtoprepare and presentatopicon engineering/ technology, itis designed to:

- Review and increasetheir understandingof thespecific topics tested.
- Improvetheir abilityto communicate that understandingto thegrader.
- Increasetheeffectiveness with which theyusethelimited examinationtime.

Course Outcome

CO1: Teaching, Laboratory & Professional practice by Academic participation

CO2: Research Focus based on Study of Journal publications

Unit-1 **Teaching Hours:30**

COURSE NOTICES

Notices pertaining to this course will be displayed on the respective departmental notice boards by the panel coordinator/instructor.Students may also check the exam notice board for notices issued by the exam division.

MAKEUPPOLICY: All students are required to attend all the lectures and presentations in the panel. Participation and cooperation will also be taken into account in the final evaluation. Requests for makeup should normally be avoided. However,in genuine cases,panel will decide action on a case by case basis.

NOTE: Seminar shall be presented in the department in presence of a committee (Batch of Teachers)constituted by HOD.The seminar marks are to be awarded by the committee. Students shall submit the seminar report in the prescribed Standard format.

Text Books And Reference Books:

Selected domain related text book will be sugessted.

Essential Reading / Recommended Reading

Research papers for the selected domain

Evaluation Pattern

-

MTCS231 - COMPUTER COMMUNICATION NETWORKS

(2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

- To understand the concepts of internetwork.
- To study the functions of different layers.
- To introduce IEEE standards employed in computer networking.
- To make the students to get familiarized with different protocols and network components.

Course Outcome

CO1: Recognize the basic requirements of building of network and layering of protocols.

CO2: Distinguish the concept of internetworking and routing through internet protocol addressing.

CO3: Discuss the role of different protocols in internetworking.

CO4: Examine the security issues and congestion control in the networks

CO5: Determine the features and operations of various application layer protocols.

Unit-1 **Teaching Hours:9**

INTRODUCTION

Building a Network, Requirements, Perspectives, Scalable Connectivity, Cost-Effective Resource sharing, Support for Common Services, Manageability, Protocol layering, Performance, Bandwidth and Latency, Delay X Bandwidth Product, Perspectives on Connecting, Classes of Links, Reliable Transmission, Stop-and-Wait , Sliding Window, Concurrent Logical Channels.

Unit-2 **Teaching Hours:9**

INTERNETWORKING- I

Switching and Bridging, Datagram's, Virtual Circuit Switching, Source Routing, Bridges and LAN Switches, Basic Internetworking (IP), Service Model, Global Addresses, Datagram Forwarding in IP, subnetting and classless addressing, Address Translation(ARP), Host Configuration(DHCP), Error Reporting(ICMP), Virtual Networks and Tunnels.

Unit-3 **Teaching Hours:9**

INTERNETWORKING- II

Network as a Graph, Distance Vector (RIP), Link State (OSPF), Metrics, The Global Internet, Routing Areas, Routing among Autonomous systems (BGP), IP Version 6(IPv6), Mobility and Mobile IP.

Unit-4 **Teaching Hours:9**

NETWORK SECURITY

Simple Demultiplexer (UDP), Reliable Byte Stream(TCP), End-to-End Issues, Segment Format, Connecting Establishment and Termination, Sliding Window Revisited, Triggering Transmission, Adaptive Retransmission, Record Boundaries, TCP Extensions, Queuing Disciplines, FIFO, Fair Queuing, TCP Congestion Control, Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit and Fast Recovery.

Unit-5 **Teaching Hours:9**

APPLICATIONS

Congestion-Avoidance Mechanisms, DEC bit, Random Early Detection (RED), Source-Based Congestion Avoidance. The Domain Name System(DNS),Electronic Mail(SMTP,POP,IMAP,MIME),World Wide Web(HTTP),Network Management(SNMP).

Text Books And Reference Books:

TEXTBOOKS

1. Larry Peterson and Bruce S Davis "Computer Networks: A System Approach" 5th Edition, Elsevier -2014

2. Douglas E Comer, "Internetworking with TCP/IP, Principles, Protocols and Architecture" 6th Edition, PHI – 2014

REFERENCE BOOKS

1. Uyless Black “Computer Networks, Protocols, Standards and Interfaces” 2nd Edition – PHI

2. Behrouz A Forouzan “TCP /IP Protocol Suite” 4th Edition – Tata McGraw-Hill

3. Andrew S. Tanenbaum, “Computer Networks”, Pearson Education 4th edition, 2012.

4. Larry L.Peterson and Brule S.Davie, “Computer Networks – A System Approach” MarGankangmann – Harcourt Asia, Fifth Edition, 2011.

5. William Stallings, “SNMP, SNMP V2, SNMPV3, RMON 1 and 2”, Pearson 2006

6.J.F Kurose and K.W. Ross, “Computer Networking –A top –down approach featuring the internet”, Pearson, 2012.

7.William Stallings, “Data & Computer Communication”, 6th Edition, Pearson Education, 2007.

8.Mani Subramanian, “Network Management: Principles and Practice”, Addison Wesley, 2000.

Essential Reading / Recommended Reading

- http://www.springer.com/engineering/signals/book/978-1-4614-6153-1
- http://www.proceedings.com/23900.html

Evaluation Pattern

Assessment of each paper

- Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)
- End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

Components of the CIA

CIA I : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

CIA II : Mid Semester Examination (Theory) : 25 marks

CIA III : Quizzes/Seminar/Case Studies/Project Work /Assignments: 10 marks

Attendance : 05 marks

Total : 50 marks

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

Objectives of this course are:

- Able to apply fundamental algorithmic ideas to process data.
- Learn to apply hypotheses and data into actionable predictions.
- Document and transfer the results and effectively communicate the findings using visualization techniques.

Course Outcome

CO1: Understand the foundations of data processing

CO2: Apply the clustering and Classification methods for modelling the data

CO3: Analysis of Statistical models and data distributions using Python Programming.

CO4: Analysis of distributed file system and Data Processing using Spark

CO5: Evaluating the results of data science experiment using Power BI.

Unit-1 **Teaching Hours:9**

INTRODUCTION AND THE DATA SCIENCE

Data science process – roles, stages in data science project – working with data from files – relational andNon-Relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – Data preprocessing-Statistics for Data Science-Data Distributions

Unit-2 **Teaching Hours:9**

MODELING METHODS

Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm, Naïve Bayes – Memorization Methods – Linear and logistic regression – unsupervised methods.

Unit-3 **Teaching Hours:9**

ANALYTICS WITH PYTHON

Data Analysis with Numpy andPandas – Visualization with SeabornMatplotlib, Plotly and Cufflinks – Scikit-learn –Regression, KNN, PCA and SVM in Python– Recommender systems – NLP with NLTK – Neural Nets and Deep Learning with Tensor Flow

Unit-4 **Teaching Hours:9**

SPARK SYSTEMS

Introduction –Hadoop vs Spark - Spark Data Frame – Group by and Aggregate –RDD – Spark SQL – Spark Running on Cluster–Machine Learning with Mlib–Collaborative Filtering–NLP Applications–Spark Streaming.

Unit-5 **Teaching Hours:9**

DELIVERING RESULTS with POWER BI

Power BI Desktop – Connecting and Shaping Data – Creating Table Relationship – Database Normalization – Snow Flake Schema – Filter Flow - DAX Calculations – Implicit and Explicit DAX Measures – DAX Function Categories - Visualization with Power BI Reports - Case studies.

Text Books And Reference Books:

1. William McKinney- Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython, O'Reilly; Second edition, 2017

2. Sandy Ryza, Uri Laserson. Advanced Analytics with Spark: Patterns for Learning from Data at Scale – O'Reilly 2017

3. Brett Powell Mastering Microsoft Power Bi, Packt Publishing, 2018

Essential Reading / Recommended Reading

1. Jake VanderPlas. Python Data Science Handbook: Essential Tools for Working with Data O'Reilly 2016.

2. Holden Karau, Andy Konwinski, Learning Spark: Lightning-Fast Big Data Analysis, O'Reilly 2015

3. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, "Practical Data Science Cookbook", Packt Publishing Ltd., 2014.

4. AurÈlienGÈron Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems O'Reilly2017.

5. Devin Knight, Brian Knight. Microsoft Power BI Quick Start Guide: Build dashboards and visualizations to make your data come to life, Packt Publishing, 2018.

Evaluation Pattern

Assessment of each paper

- Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)
- End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

Components of the CIA

CIA I : Quizzes/Seminar/Case Studies/Project Work : 10 marks

CIA II : Mid Semester Examination (Theory) : 25 marks

CIA III : Quizzes/Seminar/Case Studies/Project Work : 10 marks

Attendance : 05 marks

Total : 50 marks

MTCS243E01 - CLOUD COMPUTING (2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

Cloud computing is a model for enablingubiquitous, convenient, on-demand access to a shared pool of configurable computing resources. Cloud computing paradigm possesses tremendous momentum but its unique aspects exacerbate security and privacy challenges. Cloud computing enables increasing number of IT services to be delivered over the Internet. The cloud platform enables business to run successfully without dedicated hardware, software and services.

Course Outcome

CO1: Understand the fundamentals of Cloud Storage, Cloud Architecture and Cloud Computing

CO2: Explain Cloud Computing technologies with respect to platforms, services, network, security and applications

CO3: Analyze Virtualization techniques, Virtual machines provisioning and Migrating services.

CO4: Examine Workflow and Map-reduce programming models

CO5: Assess various Cloud applications, Security and Performance issues

Unit-1 **Teaching Hours:9**

UNDERSTANDING CLOUD COMPUTING

Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages/Disadvantages of Cloud Computing – Types of Cloud – Architecture of Cloud– Cloud Services- Web-Based Application – Pros and Cons of Cloud Service Development.

Unit-2 **Teaching Hours:9**

CLOUD COMPUTING ARCHITECTURE

Types of Cloud Service Development – Infrastructure / Hardware as a Service-Software as a Service – Platform as a Service – Web Services – On-Demand Computing – Migrating into a Cloud –Types of Clouds-Amazon Ec2 – Google App Engine – Microsoft Azure – IBM Clouds.

Unit-3 **Teaching Hours:9**

VIRTUALIZATION TECHNIQUES; VIRTUAL MACHINES PROVISIONING AND MIGRATION SERVICES

Characteristics of Virtualized Environment – Taxonomy of Virtualization Techniques– Virtualization and Cloud Computing – Pros and Cons of Virtualization – Technology Examples: Xen, VMware, Hyper-V- Virtual Machines Provisioning and Manageability–Virtual Machine Migration Services – Provisioning in the Cloud Context.

Unit-4 **Teaching Hours:9**

WORKFLOW AND MAP-REDUCE PROGRAMMING MODELS

Workflow Management Systems and Clouds- Architecture of Workflow Management Systems – Utilizing Clouds for Workflow Execution – Data-Intensive Computing– Technologies for Data-Intensive Computing – Storage Systems – Programming Platforms- Aneka MapReduce Programming – Major MapReduce Implementations for the Cloud.

Unit-5 **Teaching Hours:9**

CLOUD APPLICATIONS: SECURITY AND PERFORMANCE ISSUES

Case Study: Business and Consumer Applications: CRM and ERP, Social Networking, Multiplayer Online Gaming – Technologies for Data Security in Cloud Computing – Cloud Computing and Data Security Risk- The Cloud, Digital Identity, and Data Security–Content Level Security-Data Privacy and Security Issues – HPC in the Cloud: Performance related Issues.

Text Books And Reference Books:

1. RajkumarBuyya, Vecchiola, Selvi, "Mastering Cloud Computing", McGraw Hill. 2013.
2. Anthony Velte, Toby Velte, and Robert Elsenpeter. "Cloud Computing – A Practical Approach", McGraw Hill. 2010.

3. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wiley 2013.

Essential Reading / Recommended Reading

1. Massimo Cafaro and Giovanni Aloisio. "Grids, Clouds and Virtualization". Springer 2012.

2. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008.

Evaluation Pattern

Assessment of each paper

- Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)
- End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

Components of the CIA

CIA I : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

CIA II : Mid Semester Examination (Theory) : 25 marks

CIA III : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

Attendance : 05 marks

Total : 50 marks

MTCS244E01 - INTERNET OF THINGS (2022 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

This course introduces the basic concepts of IoT, the functionalities of different types of sensors, actuators and micro controllers. It covers the protocols used in different layers and gives insight on programming IoT for different domains.

Course Outcome

CO1: Explain the fundamental building blocks of an IoT environment from a logical and physical perspective.

CO2: Experiment with Arduino and Raspberry Pi to choose the appropriate hardware for different IoT projects.

CO3: Summarize various IoT protocols in Application and Network layers by outlining their advantages and disadvantages.

CO4: Develop IoT solutions using Arduino and Raspberry Pi to solve real life problems.

CO5: Survey successful IoT products and solutions to analyze their architecture and technologies.

Unit-1 **Teaching Hours:9**

INTRODUCTION AND BACKGROUND

Definition and Characteristics of IoT, Physical Design of IoT: Things in IoT, Logical Design of IoT: IoT functional Blocks, IoT Communication Blocks, IoT communication APIs, IoT Enabling

Technologies: WSN, Cloud Computing, Big Data Analysis, Communication Protocols, Embedded Systems.

Unit-2 **Teaching Hours:9**

IOT HARDWARE, DEVICES AND PLATFORMS

Basics of Arduino: The Arduino Hardware, The Arduino IDE, Basic Arduino Programming, Basics of Raspberry pi: Introduction to Raspberry Pi, Programming with Raspberry Pi, CDAC IoT devices: Ubimote, Wi-Fi mote, BLE mote, WINGZ gateway, Introduction to IoT Platforms, IoT Sensors and actuators.

Unit-3 **Teaching Hours:9**

IOT PROTOCOLS

IoT Data Link Protocols, Network Layer Routing Protocols, Network Layer Encapsulation Protocols, Session Layer Protocols, IoT Security Protocols, Service Discovery Protocols, Infrastructure Protocols

Unit-4 **Teaching Hours:9**

IOT PROGRAMMING

Arduino Programming: Serial Communications, Getting input from sensors, Visual, Physical and Audio Outputs, Remotely Controlling External Devices, Wireless Communication. Programming with Raspberry Pi: Basics of Python Programming, Python packages of IoT, IoT Programming with CDAC IoT devices.

Unit-5 **Teaching Hours:9**

IOT DESIGN AND CLOUD INCORPORATION

Case Studies- IoT Design and Cloud incorporation: Introduction to IOT Design, Home Automation, Smart Lighting , Home Intrusion Detection, Cities , Smart Parking , Environment , Weather Monitoring System , Weather Reporting Bot , Air Pollution Monitoring , Forest Fire Detection, Agriculture, Smart Irrigation, Productivity Applications , IoT Printer..

Text Books And Reference Books:

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.

2. Margolis, Michael. "Arduino Cookbook: Recipes to Begin, Expand, and Enhance Your Projects. " O'Reilly Media, Inc.", 2011.

3. Monk, Simon. Raspberry Pi cookbook: Software and hardware problems and solutions. " O'Reilly Media, Inc.", 2016.

Essential Reading / Recommended Reading

1. The Internet of Things: Applications to the Smart Grid and Building Automation by – Olivier Hersent, Omar Elloumi and David Boswarthick – Wiley Publications -2012.

2. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.

3. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a Highly Connected World", Cambridge University Press, 2010.

4. Al-Fuqaha, Ala, et al. "Internet of things: A survey on enabling technologies, protocols, and applications." IEEE Communications Surveys & Tutorials 17.4 (2015): 2347-2376.

5. Tsitsigkos, Alkiviadis, et al. "A case study of internet of things using wireless sensor networks and smartphones." Proceedings of the Wireless World Research Forum (WWRF) Meeting: Technologies and Visions for a Sustainable Wireless Internet, Athens, Greece. Vol. 2325. 2012.

Ye, Mengmei, et al. "Security Analysis of Internet-of-Things: A Case Study of August Smart Lock."

Evaluation Pattern

Assessment of each paper

- Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)
- End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

Components of the CIA

CIA I : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

CIA II : Mid Semester Examination (Theory) : 25 marks

CIA III : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

Attendance : 05 marks

Total : 50 marks

MTCS251 - NETWORKING LAB (2022 Batch)

Total Teaching Hours for Semester:60 **No of Lecture Hours/Week:4**

Max Marks:50 **Credits:2**

Course Objectives/Course Description

- Developing a project to implement some of the areas in networking using different protocols and various techniques over wireless Ad-hoc networks with varying traffic loads.

Course Outcome

CO1: Examine the performances of Routing protocol

CO2: Experiment with different application layer protocols

CO3: Experiment with different security techniques over peer to peer medium.

Unit-1 **Teaching Hours:60**

Design, develop the project to implement following areas in networks

- TCP/IP suite like ICMP Protocol, TFTP, NNTP, Proxy Server, Application Firewall, Web browsers, ARP, DHCP, ICMP, DNS and SNMP.
- Performance Evaluation of TCP and UDP over Wireless Ad-hoc Networks with varying traffic loads.
- Prevention of ARP spoofing: A probe packet based technique.
- Security techniques over media streaming over peer-to-peer networks.
- Various techniques in optimization of bandwidth consumption, request for unauthorized access, signal-to-noise ratio, download channel capacity, packet delivery ratio and inter-packet delay.

Text Books And Reference Books:

TEXTBOOKS

1. Larry Peterson and Bruce S Davis “Computer Networks: A System Approach” 5th Edition, Elsevier -2014

2. Douglas E Comer, “Internetworking with TCP/IP, Principles, Protocols and Architecture” 6th Edition, PHI – 2014

REFERENCE BOOKS

1. Uyless Black “Computer Networks, Protocols, Standards and Interfaces” 2nd Edition – PHI

2. Behrouz A Forouzan “TCP /IP Protocol Suite” 4th Edition – Tata McGraw-Hill

3. Andrew S. Tanenbaum, “Computer Networks”, Pearson Education 4th edition, 2012.

4. Larry L.Peterson and Brule S.Davie, “Computer Networks – A System Approach” MarGankangmann – Harcourt Asia, Fifth Edition, 2011.

5. William Stallings, “SNMP, SNMP V2, SNMPV3, RMON 1 and 2”, Pearson 2006

6.J.F Kurose and K.W. Ross, “Computer Networking –A top –down approach featuring the internet”, Pearson, 2012.

7.William Stallings, “Data & Computer Communication”, 6th Edition, Pearson Education, 2007.

8.Mani Subramanian, “Network Management: Principles and Practice”, Addison Wesley, 2000.

Essential Reading / Recommended Reading

- http://www.springer.com/engineering/signals/book/978-1-4614-6153-1
- http://www.proceedings.com/23900.html

Evaluation Pattern

End semester practical examination	: 50 marks
Records	: 05 marks
Mid semester examination	: 10 marks
Class work	: 10 marks
Total	**: 50 marks**

Mid semester practical examination will be conducted during regular practical hour with prior intimation to all candidates. End semester practical examination will have two examiners an internal and external examiner.

MTCS252 - DATA SCIENCE LAB (2022 Batch)

Total Teaching Hours for Semester:60 **No of Lecture Hours/Week:4**

Max Marks:50 **Credits:2**

Course Objectives/Course Description

Able to apply fundamental algorithmic ideas to process data.

Learn to apply hypotheses and data into actionable predictions.

Document and transfer the results and effectively communicate the findings using visualization techniques.

Course Outcome

CO1: Apply and evaluate the clustering and Classification methods for modeling the data

CO2: Apply the Statistical models and data distributions using Python Programming.

Unit-1 **Teaching Hours:60**

List of Experiments

- Introduction to the Weka machine learning toolkit

- To learn to perform exploratory data analysis using the R language
- Introduction to linear regression using R
- Classification using the Weka toolkit – Part 1

Text Books And Reference Books:

-

Essential Reading / Recommended Reading

-

Evaluation Pattern

For subjects having practical as part of the subject

End semester practical examination	: 50 marks
Records	: 05 marks
Mid semester examination	: 25 marks
Class work	: 10 marks
Total	**: 50 marks**

Mid semester practical examination will be conducted during regular practical hour with prior intimation to all candidates. End semester practical examination will have two examiners an internal and external examiner.

MTCS345E10 - WEB TECHNOLOGY (2021 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

This course is designed to introduce programming experience to techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages. Basic animation programming is also introduced with an emphasis on media-rich content creation, distribution and tracking capabilities.

Course Outcome

CO1: Build web applications using PHP, JSP and Servlets and client side script technologies like HTML, CSS and JavaScript with Apache web server. (L3)

CO2: Design and Integrate database environment to web applications being developed. Describe sessions conceptually and implement using cookies and URL. (L3)

CO3: Examine the XML applications with DTD and style sheets that span multiple domains and across various platforms. (L4)

CO4: Examine the reasons and effects of nonstandard client-side scripting language characteristics, such as limited data types, dynamic variable types and properties, and extensive use of automatic type conversion. (L4)

CO5: Examine the server side programming. (L4)

Unit-1 **Teaching Hours:9**

INTRODUCTION

Introduction – Network concepts – Web concepts – Internet addresses - Retrieving Data with URL – HTML – DHTML: Cascading Style Sheets - Scripting Languages: JavaScript.

Unit-2 **Teaching Hours:9**

COMMON GATEWAY INTERFACE

Common Gateway Interface: Programming CGI Scripts – HTML Forms – Custom Database Query Scripts – Server Side Includes – Server security issues

Unit-3 **Teaching Hours:9**

XML AND RICH INTERNET APPLICATIONS

XML- XSL, XSLT, DOM ,RSS, Client Technologies- Adobe Flash, Flex, Microsoft Silverlight.

Unit-4 **Teaching Hours:9**

SERVER SIDE PROGRAMMING-I

Server side Programming – PHP- Passing variables between pages, Using tables, Form elements. Active server pages – Java server pages

Unit-5 **Teaching Hours:9**

SERVER SIDE PROGRAMMING-II & APPLICATIONS

Java Servlets: Servlet container – Exceptions – Sessions and Session Tracking – Using Servlet context – Dynamic Content Generation – Servlet Chaining and Communications. Simple applications – Internet Commerce – Database connectivity.

Text Books And Reference Books:

1. Deitel, Deitel and Neito, "INTERNET and WORLD WIDE WEB – How to program", Pearson education asia, 4th Edition , 2011

2. Beginning PHP, Apache, MySql Web Development , Timothy, Elizabath, Jason, Wrox ,2012

Essential Reading / Recommended Reading

1. Eric Ladd and Jim O'Donnell, et al, "USING HTML 4, XML, and JAVA1.2", PHI publications, 2003.
2. Jeffy Dwight, Michael Erwin and Robert Nikes "USING CGI", PHI Publications, 1999

Evaluation Pattern

Assessment of each paper

Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)

End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

MTCS381 - INTERNSHIP (2021 Batch)

Total Teaching Hours for Semester:60 **No of Lecture Hours/Week:4**

Max Marks:50 **Credits:2**

Course Objectives/Course Description

Internships are short-term work experiences that will allow a student to observe and participate in professional work environments and explore how his interests relate to possible careers. They are important learning opportunities trough industry exposure and practices. More specifically, doing internships is beneficial because they provide the opportunity to:

Course Outcome

CO1: Design solutions to real time complex engineering problems using the concepts of Computer Science and Information Technology through independent study.

CO2: Demonstrate teamwork and leadership skills with professional ethics.

CO3: Prepare an internship report in the prescribed format and demonstrate oral communication through presentation of the internship work.

Unit-1 **Teaching Hours:60**

Regulations

1.The student shall undergo an Internship for30 days starting from the end of 2nd semester examination and completing it during the initial period of 3rd semester.

2.The department shall nominate a faculty as a mentor for a group of students to prepare and monitor the progress of the students

3. The students shall report the progress of the internship to the mentor/guide at regular intervals and may seek his/her advise.

4. The Internship shall be completed by the end of 2nd semesters.

5. The students are permitted to carry out the internship outside India with the following conditions, the entire expenses are to be borne by the student and the University will not give any financial assistance.

6. Students can also undergo internships arranged by the department during vacation.

7. After completion of Internship, students shall submit a report to the department with the approval of both internal and external guides/mentors.

8. There will be an assessment for the internship for 2 credits, in the form of report assessment by the guide/mentor and a presentation on the internship given to department constituted panel.

Text Books And Reference Books:

Related to the Internship domain text books are sugessted.

Essential Reading / Recommended Reading

Readings Related to the Internship domain

Evaluation Pattern

Internal 50 Marks

MTCS382 - DISSERTATION PHASE - I (2021 Batch)

Total Teaching Hours for Semester:300 **No of Lecture Hours/Week:20**

Max Marks:200 **Credits:10**

Course Objectives/Course Description

During this project phase I session, each student is expected to prepare and present a topic on engineering/ technology on their domain interest to persue the project work, it is designed to:

- Review and increase their understanding of the specific topics identified.
- Improve their ability to communicate that understanding to the grader.
- Increase the effectiveness with which they use the limited examination time.

Course Outcome

CO1: Students will be understanding concepts

CO2: Understanding the identified domain

CO3: Framing the research problem

CO4: Project design analysis

CO5: Research literature writing

Unit-1 **Teaching Hours:200**

DISSERTATION PHASE -1

Project Work

Text Books And Reference Books:

Journal article, industry white papers text books basedon the domain on which the student will be doing his/her work.

Essential Reading / Recommended Reading

Recommendation will be given Based on the domian in which student will be interested and planning to do the dissertation work

Evaluation Pattern

- ❖ Assessment of Project Work(Phase I)
- ▪ Continuous Internal Assessment:100 Marks
- ♦ Presentation assessed by Panel Members
- ♦ Guide
- ♦ Mid semester Project Report

End semester Examination :100 Marks

Presentation assessed by Panel Members

- ♦ Guide
- ♦ End semester Project Report

MTEC362 - COMPRESSION AND ENCRYPTION TECHNIQUES (2021 Batch)

Total Teaching Hours for Semester:45 **No of Lecture Hours/Week:3**

Max Marks:100 **Credits:3**

Course Objectives/Course Description

This course aims at making the students get an understanding of the compression techniques available for multimedia applications and also get an understanding of the encryption that can be implemented along with the compression.

Course Outcome

C01: Explain the taxonomy of multimedia compression techniques{L2} {PO1,PO2,PO3}

C02: Explain the concept of text compression through the coding techniques {L2} {PO1,PO2}

C03: Describe the motion estimation techniques used in video compression {L2} {PO1,PO2,PO3}

CO4: Explain the concept of encryption with the models employed {L2} {PO1,PO2,PO3}

C05: Explain the symmetric ciphers and their techniques & standards {L2} {PO1,PO2,PO3}

Unit-1 **Teaching Hours:9**

INTRODUCTION TO COMPRESSION

Special features of Multimedia – Graphics and Image Data Representations – Fundamental Concepts in Video and Digital Audio – Storage requirements for multimedia applications -Need for Compression - Taxonomy of compression techniques – Overview of source coding

Unit-2 **Teaching Hours:9**

TEXT COMPRESSION

Compaction techniques – Huffmann coding – Adaptive Huffmann Coding – Arithmatic coding – Shannon-Fano coding – Dictionary techniques – LZW family algorithms

Unit-3 **Teaching Hours:9**

VIDEO COMPRESSION

Video compression techniques and standards – MPEG Video Coding I: MPEG – 1 and 2 – MPEG Video Coding II: MPEG – 4 and 7 – Motion estimation and compensation techniques – H.261 Standard

Unit-4 **Teaching Hours:9**

INTRODUCTION TO ENCRYPTION

Introduction: Services, Mechanisms and Attacks, OSI security Architecture, Model for network Security; Classical Encryption Techniques:Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Stegnography;

Unit-5 **Teaching Hours:9**

CIPHERS

Block Ciphers and Data Encryption Standard: Simplified DES, Block Cipher Principles, Data Encryption Standard, Strength of DES, Differential and Linear Crypt Analysis, Block Cipher Design Principles, Block Cipher Modes of Operation

Text Books And Reference Books:

1. Khalid Sayood : Introduction to Data Compression, Morgan Kauffman Harcourt India, 2nd Edition, 2000
2. David Salomon : Data Compression – The Complete Reference, Springer Verlag New York Inc., 4th Edition, 2006

Essential Reading / Recommended Reading

1. Yun Q.Shi, HuifangSun : Image and Video Compression for Multimedia Engineering - Fundamentals, Algorithms & Standards, CRC press, 2008
2. Jan Vozer : Video Compression for Multimedia, AP Profes, NewYork, 1995.
3. William Stallings, "Cryptography and Network Security", 6th. Ed, Prentice Hall of India, New Delhi ,2013
4. William Stallings, "Network Security Essentials", 5thed. Prentice Hall of India, New Delhi

Evaluation Pattern

Assessment of each paper

Continuous Internal Assessment (CIA) for Theory papers: 50% (50 marks out of 100 marks)

End Semester Examination(ESE) : 50% (50 marks out of 100 marks)

Components of the CIA

CIA I : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

CIA II : Mid Semester Examination (Theory) : 25 marks

CIA III : Quizzes/Seminar/Case Studies/Project Work /Assignments : 10 marks

Attendance : 05 marks

Total : 50 marks

MTCS483 - DISSERTATION PHASE-II (2021 Batch)

Total Teaching Hours for Semester:480 **No of Lecture Hours/Week:32**

Max Marks:200 **Credits:16**

Course Objectives/Course Description

During this project phase I session, each student is expected to prepare and present a topic on engineering/ technology on their domain interest to persue the project work, it is designed to:

- Review and increase their understanding of the specific topics identified.
- Improve their ability to communicate that understanding to the grader.
- Increase the effectiveness with which they use the limited examination time.

Course Outcome

CO1: Understanding the identified domain

CO2: Framing the research problem

CO3: Project design analysis

CO4: Research literature writing

Unit-1 **Teaching Hours:480**

DISSERTATION PHASE -II

Project Work

Text Books And Reference Books:

Journal article, industry white papers text books basedon the domain on which the student will be doing his/her work.

Essential Reading / Recommended Reading

Recommendation will be given Based on the domian in which student will be interested and planning to do the dissertation work

Evaluation Pattern

Assessment of Project Work(Phase II) and Dissertation

▪ Continuous Internal Assessment:100 Marks

♦ Presentation assessed by Panel Members

♦ Assessed by Guide

♦ Mid Semester Project Report

▪ End Semester Examination:100 Marks

♦ Viva Voce

♦ Demonstration

♦ Project Report

▪ Dissertation (Exclusive assessment of Project Report): 100 Marks

♦ Internal Review : 50 Marks

♦ External review : 50 Marks