SOURASHTRA COLLEGE, MADURAI– 625004
(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)
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GRADUATE ATTRIBUTES

1. **Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of a post-graduate programme of study.

2. **Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

3. **Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.

4. **Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.

5. **Analytical reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesise data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

6. **Research-related skills:** A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

7. **Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.

8. **Scientific reasoning:** Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

9. **Reflective thinking:** Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

10. **Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

11. **Self-directed learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

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12. **Lifelong learning:** Ability to acquire knowledge and skills, including "learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

13. **Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

14. **Moral and ethical awareness/reasoning:** Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

15. **Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PROGRAMME OUTCOMES (POs)

On successful completion of **MCA Programme**, the students are expected to

1. **Computational Knowledge:** Able to apply knowledge of Computing and Technological advances appropriate to the programme, Basic Mathematics, Computing Specialization and Domain Knowledge for the abstraction and conceptualization of proper computing models from defined problems related to various real-life applications for any given requirement.

2. **Problem Analysis and Solving:** Ability to Identify, critically analyze, invent, formulate research related activities to provide solutions for complex computer science related real-life problems using concepts of Mathematics, Computing Science and Relevant Domains with appropriate consideration reaching valid conclusions and feasible computing solutions.

3. **Research Activity:** Apply research-based knowledge and methodologies to design, analyze and interpretation of data and find the solutions for complex problems by creating, identifying and applying appropriate techniques, resources, and modern computing tools. Hence ability to select modern computing tools, skills and techniques necessary for innovative software solutions.

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4. **Critical & Reflective Thinking:** An ability for innovation in real-life situations and to design, implement, and evaluate a computer-based system, process, component, or program to meet stakeholder needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations in domains like Banking, Insurance, Healthcare Systems and Multimedia and Mass Communications.

5. **Professional Ethics:** Ability to apply and commit professional ethics and cyber regulations in a global economic environment for professional computing practices and develop the youth with social commitments.

6. **Life-long Learning:** Identify and recognize the need and have the ability to engage in independent and continuous learning as a computing professional, which will boost self-confidence.

7. **Communication Efficacy:** Communicate effectively with the computing community and with society by being able to comprehend effective documentations and presentations to attract a wide range of audiences. They will be able to communicate technical information effectively, both orally and in writing

8. **Individual and Team Work:** An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal. Develop ability to demonstrate team work with the ability of leadership, analytical reasoning for solving time critical problems and strong human values for responsible professional.

9. **Innovation and Entrepreneurship:** Identify a timely opportunity, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society. Find out right opportunity for entrepreneurship and create and add value for the betterment of an individual and society at large.

10. **Social Responsibility:** An ability to analyze the local and global impact of business solutions on individuals, organizations and society. Find and access Social and Environmental issues for local and global needs and give relevant solutions for them.

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- To prepare as successful professionals ready for Industry, Government sectors, Academia, Research, Entrepreneurial Pursuit and Consultancy firms by acquiring in-depth knowledge of fundamental concepts in Mathematical and Programming skills for holistic development.

- Contribute to research of their chosen field and function and communicate effectively to do both individually and in a multi-disciplinary team by applying current tools, technologies and research to create systems for solving industry-oriented problems.

- Exhibit professionalism, competent work ethics, effective communication skills, team work in their profession and be able to adapt current trends by engaging in life-long learning through professional activities to admit themselves as high ethical, professional standards and responsible citizens with social commitments.

- Analyze real life problems, design and develop computing systems appropriate to its solutions to problems across a broad range of application domains that are technically sound, economically feasible and socially acceptable

- Ability to understand, analyze, design, develop and maintain the software application with latest technologies in the areas allied to recent trends in computer science to deliver a quality product for business success.

PROGRAMME SPECIFIC OBJECTIVES (PSOs)

- Utilizes kills and knowledge for computing practice with commitment on social, ethical, cyber and legal values. And also communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.

- Ability to understand, analyze, design, develop and support the software application with latest technologies in the recent areas of computer science to deliver a quality product for business success.

- Ability to pursue careers in Government/IT industry/ consultancy/ research and development, teaching and allied areas related to Computer Science.

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M.C.A. – II YEAR

COURSE STRUCTURE - III SEMESTER

Course code	Name of the Course	Category	Hrs./Week	Credits	Exam/Hrs.	CA	SE	Total Marks	Focus on Employability, Entrepreneurship / Skill Development
21MCAC31	**Core – 11:** Software Engineering	PC	4	3	3	25	75	100	Employability
21MCAC32	**Core – 12:** Bigdata Analytics	PC	4	3	3	25	75	100	Employability
21MCAC33	**Core – 13:** Web Programming	PC	4	3	3	25	75	100	Employability/ Entrepreneurship
Elective		PE	4	4	3	25	75	100	Employability/ Skill Development
21MCAE31	1. Cyber Security								
21MCAE32	2. Artificial Intelligence								
21MCAE33	3. Human Resource Management								
21MCAE34	4. Graph Theory								
21MCAP31	Data Analytics using Python & R - **Lab**	PC	4	3	3	40	60	100	Employability/ Entrepreneurship
21MCAP32	Web Programming - **Lab**	PC	2	2	3	40	60	100	Employability/ Entrepreneurship
21MCAP33	Angular JS - **Lab**	PC	2	2	3	40	60	100	Employability/ Entrepreneurship
21MCAN31	**NME**: Management Information System	NME	4	3	3	25	75	100	Skill Development
21MCACV1	Mini Project	EEC	2	2	-	40	60	100	Skill Dev./ Employability/ Entrepreneurship
	Value Added Course/ Internship	SL	-	-		-	-	-	Skill Dev. / Employability
	Total		30	25		285	615	900	

One Elective paper has to be chosen out of four Electives

PC –Programme Core   **PE** – Professional Electives

EEC –Employability Enhancement courses   **SL** – Self-phased Learning

CA –Class Assessment (Internal)   **SE** – Summative Examination

NME –Non –Major Elective   **T** –Theory   **P** –Practical

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COURSE STRUCTURE - IV SEMESTER

Course code	Name of the Course	Category	Hrs./Week	Credits	Exam/Hrs.	CA	SE	Total Marks	Focus on Employability, Entrepreneurship / Skill development
21MCAC41	**Core – 14:** Internet of Things	PC	4	3	3	25	75	100	Employability
Elective		PE	6	4	3	25	75	100	Employability
21MCAE41	1. Statistics for Data Science								
21MCAE42	2. Machine Learning								
21MCAE43	3. Digital Image Processing								
21MCAE44	4. Digital Marketing								
21MCACV2	Project	EEC	20	12	-	40	60	100	**Employability, Entrepreneurship / Skill development**
	Total		**30**	**19**		**90**	**210**	**300**	

One Elective paper has to be chosen out of four Electives

PC	**–Programme Core**	**PE**	**– Professional Electives**
EEC	**–Employability Enhancement courses**	**SL**	**– Self-phased Learning**
CA	**–Class Assessment (Internal)**	**SE**	**– Summative Examination**
NME	**–Non –Major Elective**	**T**	**–Theory** **P** **–Practical**

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COURSE STRUCTURE - III SEMESTER

Course code	Name of the Course	Category	Hrs./Week	Credits	Exam/Hrs.	CA	SE	Total Marks	Focus on Employability, Entrepreneurship / Skill Development
21MCAC31	**Core – 11:** Software Engineering	PC	4	3	3	25	75	100	Employability
21MCAC32	**Core – 12:** Bigdata Analytics	PC	4	3	3	25	75	100	Employability
21MCAC33	**Core – 13:** Web Programming	PC	4	3	3	25	75	100	Employability/ Entrepreneurship
Elective		PE	4	4	3	25	75	100	Employability/ Skill Development
21MCAE31	1. Cyber Security								
21MCAE32	2. Artificial Intelligence								
21MCAE33	3. Human Resource Management								
21MCAE34	4. Graph Theory								
21MCAP31	Data Analytics using Python & R - **Lab**	PC	4	3	3	40	60	100	Employability/ Entrepreneurship
21MCAP32	Web Programming - **Lab**	PC	2	2	3	40	60	100	Employability/ Entrepreneurship
21MCAP33	Angular JS - **Lab**	PC	2	2	3	40	60	100	Employability/ Entrepreneurship
21MCAN31	**NME:** Management Information System	NME	4	3	3	25	75	100	Skill Development
21MCACV1	Mini Project	EEC	2	2	-	40	60	100	Skill Dev./ Employability/ Entrepreneurship
	Value Added Course/ Internship	SL	-	-		-	-	-	Skill Dev. / Employability
Total			30	25		285	615	900	

One Elective paper has to be chosen out of four Electives

PC	–Programme Core	**PE**	– Professional Electives
EEC	–Employability Enhancement courses	**SL**	– Self-phased Learning
CA	–Class Assessment (Internal)	**SE**	– Summative Examination
NME	–Non –Major Elective	**T**	–Theory **P** –Practical

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAC31	SOFTWARE ENGINEERING	PC	4	-	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

This course helps the student to develop the software in systematic manner, which comprises of various techniques and deliver the software in good quality and adhere to the standardization.

COURSE OBJECTIVES:

- Introduction to Software Engineering, Design, Testing and Maintenance.
- Enable the students to learn the concepts of Software Engineering.
- Learn about Software Project Management, Software Design &Testing.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Understand about Software Engineering process.	Upto K5
CO 2	Understand about Software project management skills, design and quality management.	Upto K5
CO 3	Analyze Software Requirements and Specification.	Upto K5
CO 4	Analyze Software Testing, Maintenance and Software Re-Engineering.	Upto K5
CO 5	Design and conduct various types and levels of software quality for a software project.	Upto K5

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

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SOFTWARE ENGINEERING

UNIT – I:

Introduction: The Problem Domain – Software Engineering Challenges - Software Engineering Approach – **Software Processes**: Software Process – Characteristics of a Software Process – Software Development Process Models– Other software processes.

UNIT – II:

Requirements Analysis and Specification: Requirements gathering and analysis - Software Requirement specification – Formal System Specification – Axiomatic Specification – Algebraic Specification – Executable Specification and 4GL. Case study: Student Result management system.

UNIT – III:

Software Project Management (SPM): SPM complexities - Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead's software science – Staffing level estimation – Scheduling - Organization and Team Structures – Staffing – Risk management–Software Configuration Management.

UNIT – IV:

Software Design: Overview of the Design process – Characteristics of a good software design – Cohesion and coupling – Layered arrangement of modules – Approaches to software design. **Function Oriented Design:** overview – structured analysis – Developing DFD model – structured design – detailed design.

UNIT –V:

Coding and Testing: Coding – code review – software documentation – testing – unit testing – black-box testing – white-box testing – debugging – program analysis tools – testing object-oriented programs – system testing – general issues associated with testing. **Software Reliability and Quality Management** – Software reliability – statistical testing - Software Quality - Software Quality Management System - ISO 9000 – SEI CMM – Other important quality standards – six sigma. **Software Maintenance** – Characteristics of software Maintenance – Software Reverse Engineering – Software Maintenance process models – Estimation of maintenance cost.

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TEXT BOOKS:

1. *An Integrated Approach to Software Engineering,* Pankaj Jalote, Narosa Publishing House, New Delhi, 3rd Edition, 2005.

2. *Fundamentals of Software Engineering*, Rajib Mall, PHI Publication, 3rd Edition, 2018.

REFERENCEBOOKS:

1. *Software Engineering* – K. K. Aggarwal and Yogesh Singh, New Age International Publishers, 3rd edition, 2008.

2. *A Practitioners Approach - Software Engineering*, R. S. Pressman, McGrawHill, 8th edition, 2019.

3. *Fundamentals of Software Engineering*, Carlo Ghezzi, M. Jarayeri, D. Manodrioli, PHI Publication, 2nd edition, 2002.

DIGITAL TOOLS:

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]

- https://www.javatpoint.com/software-engineering-tutorial
- https://onlinecourses.swayam2.ac.in/cec20_cs07/preview
- https://onlinecourses.nptel.ac.in/noc19_cs69/preview

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	3	1	2	1	2	2	2	3	3	3
CO2	2	2	3	3	1	2	1	3	3	2	3	3	3
CO3	3	3	3	3	1	2	1	3	3	2	3	3	3
CO4	3	3	3	3	1	2	1	3	3	2	3	3	3
CO5	3	3	3	3	1	2	1	3	3	2	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Prof. O. K. HARIHARAN

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAC32	BIGDATA ANALYTICS	PC	4	-	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

Big Data Analytics includes introduction to Big Data, Big Data Analytics, The Big Data Technology, introduction to MAPREDUCE Programming: and introduction to Recommendation Engines.

COURSE OBJECTIVES:
- To understand Characteristics and challenges of Big Data.
- To interpret Big Data Analytics and Big Data Technologies.
- To demonstrate MAPREDUCE Programming and Recommendation Systems.

COURSE OUTCOMES (COs):
        After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Understand the characteristics and challenges of Big Data.	Upto K5
CO 2	Determine Big Data Analytics.	Upto K5
CO 3	Utilize Hadoop for Big Data Technologies.	Upto K5
CO 4	Demonstrate MAP REDUCE Programming.	Upto K5
CO 5	Describe types of Recommendation Systems using Big Data Analytics.	Upto K5

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE**

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BIG DATA ANALYTICS

UNIT – I: INTRODUCTION

Introduction to Big Data: Characteristics of Data – Evolution of Big Data – Definition of Big Data – Challenges with Big Data – What is Big Data – Other Characteristics of Data Which are not Definitional Traits of Big Data – Why Big Data – Are we just an Information Consumer or Do we also Produce Information –Traditional Business Intelligence(BI) versus Big Data – A Typical Data warehouse Environment – A Typical Hadoop Environment – What is New Today – What is Changing in the Realms of Big Data.

UNIT – II: BIG DATA ANALYTICS

Big Data Analytics: Classification of Analytics – Greatest Challenges that Prevent Businesses from Capitalizing on Big Data – Top Challenges Facing Big Data – Why is Big Data Analytics Important – What kind of Technologies are we Looking Toward to Help Meet the Challenges Posed by Big Data – Data Science – Data Scientist Your New Best Friend – Terminologies Used in Big Data Environments – Basically Available Soft State Eventual Consistency – Few Top Analytics Tools.

UNIT – III: THE BIG DATA TECHNOLOGY

The Big Data Technology Landscape – No SQL – usage – types – advantages – use of NoSQL in industry – vendors – SQL vs NoSQL – NewSQL – Comparison of SQL, NoSQL, and NewSQL. Hadoop. Features of Hadoop. Key advantages of Hadoop, Version of Hadoop- Overview of hadoop Ecosystems - Hadoop distribution- Hadoop versus SQL – Integrated Hadoop System Offered by Leading Markers Vendors - Cloud–based Hadoop Solutions.

UNIT – IV: INTRODUCTION TO HADOOP AND MAP REDUCE PROGRAMMING

Introduction to Hadoop**:** Introducing Hadoop – Why Hadoop – Why not RDBMS – RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview – Use Case of Hadoop – Hadoop Distributors – HDFS (Hadoop Distributed File System) – Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN (Yet Another Resource Negotiator) – Interacting with Hadoop Ecosystem. Introduction to MAP REDUCE Programming: Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.

UNIT – V: RECOMMENDATION ENGINES

Introduction to Recommendation Engines: Recommendation engine definition – Need for Recommender Systems – Big Data Driving the Recommender Systems –Types of Recommender Systems –Evolution of Recommender Systems with Technology. Evolution of Recommendation Engines Explained: Evolution of Recommendation Engines – Nearest Neighborhood-based Recommendation Engines – Content-based Recommender Systems – Hybrid Recommender Systems – Model-based Recommender Systems.

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TEXT BOOKS:

1. *Big Data and Analytics*, Seema Acharya and Subhashini Chellappan, 2nd edition, Wiley India Private Limited, 2017.

2. *Building Recommendation Engines.* **-** Suresh Kumar Gorakala, 1st edition, Packt Publishing Limited, United Kingdom, 2016.

REFERENCE BOOKS:

1. *Big Data Strategies,* Pam Baker, 1st edition, Cengage Learning India Private Limited, 2016.

2. *Big Data,* Dr. Anil Maheshwari, 1st edition, Published by McGraw Hill Education (India) Private Limited, 2017.

3. *Big Data Fundamentals Concepts, Driver & Techniques,* Thomas Erl, Wajid Khattak and Paul Buhler, 3rd Edition, Pearson publication, 2018.

DIGITAL TOOLS:

- https://www.tutorialspoint.com/big_data_analytics/index.html
- https://www.edureka.co/blog/big-data-tutorial
- https://www.tutorialride.com/big-data-analytics/big-data-analytics-tutorial.html
- https://www.guru99.com/bigdata-tutorials.html

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	3	1	2	1	2	2	2	3	3	3
CO2	3	3	3	3	1	2	1	3	3	3	3	3	3
CO3	3	3	3	3	1	2	1	3	3	3	3	3	3
CO4	3	3	3	3	1	2	2	3	3	3	3	3	3
CO5	3	3	3	3	1	2	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. V. K.VIJAYAKUMAR

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAC33	WEB PROGRAMMING	PC	4	-	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	✓

COURSE DESCRIPTION:

To acquire the knowledge about the basic of web design creation and the implementation of various Tags, Creation of Tables, Linking web pages, Frame set. Able to design web page application using client-side scripting language.

COURSE OBJECTIVES:
1. Introduce the basic concepts of HTML.
2. To acquire the knowledge about various TAGS.
3. Able to develop Web Design Application.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Attain the knowledge about the Basic of HTML Tags.	Upto K5
CO 2	Know and understand about web page creation.	Upto K5
CO 3	Understand about the usage of Various Tags.	Upto K5
CO 4	Gain the knowledge about scripting language.	Upto K5
CO 5	Develop and design web-based application program.	Upto K5

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE

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WEB PROGRAMMING

UNIT – I: Introduction to Html
Webserver – Web client/browser – HTML: HTML Tags – Paired Tags – Singular Tags – Commonly used HTML Command: Structure of HTML – Titles and Footers – Text Formatting – Heading Styles, Drawing Lines – Text Styles – other Text Effects.

UNIT – II: Lists and Table
Types of Lists: Ordered List – Unordered List – Definition List – Adding Graphics to HTML Documents: Border, Width and Height, Align, Alt Attribute – Table: Caption Tag – Using Width and Border, Cell padding, Cell spacing, Background color property, Colspan and Rowspan Attributes.

UNIT – III: Linking Documents
Links: External and Internal Document References – Images as Hyperlinks – Frames: Introduction – FRAME SET Tag and FRAME Tag. Dynamic HTML: Cascading Style Sheets (CSS) – class -using <div> & <span> tag – external style sheets.

UNIT – IV: Java Script
Introduction – Basic Programming Techniques: Data type and Literal – Java Script Array – Dense Array – Element of an Array – Operators and Expression in Java Script – Conditional Checking – Super Controlled – Endless Loop – Functions in Javascript: Built-in function, User Defined Function.

UNIT – V: Event handling
Dialog Boxes: Alert Dialog box, Prompt Dialog box, Confirm Dialog box – Understanding Object in HTML: Properties and Methods of HTML Objects – Handling events using Java Script – FORMS Used by a Website: Form object methods – Other Built-in objects- User defined objects.

TEXT BOOK:
HTML, Javascript, DHTML and PHP, IVAN BAYROSS, 4th Revised Edition, bpb Publication, 2010.

REFERENCES BOOKS:
1. *Mastering HTML,CSS and Javascript Web publishing,* Laura lemay, RafeColburn, Jennifer Kyrnin. bpb Publication, 2016.
2. *HTML 101: The Illustrated Guide to Learning HTML & CSS,* Jo Foster elluminet press, 2018.

DIGITAL TOOLS:
1. https://www.w3schools.com/js/, 2. https://www.tutorialspoint.com/javascript/index.html
3. https://javascript.info/,   4.https://www.tutorialspoint.com/html/

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	3	1	2	1	3	3	2	3	3	3
CO2	2	3	3	3	1	2	1	3	3	3	3	3	3
CO3	3	3	3	3	1	2	1	3	3	3	3	3	3
CO4	3	3	3	3	1	2	2	3	3	3	3	3	3
CO5	3	3	3	3	1	3	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level
COURSE DESIGNER: Prof. T. S. B. ARUNPRASANTH

Passed in the BOS Meeting held on 19/03/2022   **Signature of the Chairman**

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

MASTER OF COMPUTER APPLICATIONS (M.C.A)
SYLLABUS (Under CBCS based on OBE)
(with effect from 2021 – 2022)

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE31	CYBER SECURITY	PE	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

Cyber Security courses aims to equip students with the basic knowledge to identify the computer system vulnerabilities, cyber law and also prevent damage such as loss of data, loss of money through viruses.

COURSE OBJECTIVES:

- To make the students understand the difference between threat, risk, attack and vulnerability and able to realize how threats materialize into attacks.
- To make the students analyze typical threats, attacks and exploits and the motivations behind them.
- To make the students study about cyber laws in different countries.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Understand the physical and logical perimeters of information assets & security awareness.	Upto K5
CO 2	Determine to protect computer systems & networks from current and future cyber security attacks.	Upto K5
CO 3	Communicate effectively to address information security issues.	Upto K5
CO 4	Examine the access controls, to monitor and managing the review process.	Upto K5
CO 5	Study the cyber laws in different countries related to cyber security and the legal issues in cyber cases.	Upto K5

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE

Passed in the BOS Meeting held on 19/03/2022　　　　　　　**Signature of the Chairman**

SOURASHTRA COLLEGE, MADURAI– 625004
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(with effect from 2021 – 2022)

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CYBER SECURITY

UNIT – I: INTRODUCTION TO CYBER SECURITY
Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication - Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks

UNIT – II: SECURITY IN OPERATING SYSTEM & NETWORKS
Security in Operating Systems - Security in the Design of Operating Systems -Rootkit - Network security attack- Threats to Network Communications - Wireless Network Security - Denial of Service - Distributed Denial-of-Service.

UNIT – III: DEFENSES: SECURITY COUNTER MEASURES
Cryptography in Network Security - Firewalls - Intrusion Detection and Prevention Systems - Network Management - Databases - Security Requirements of Databases - Reliability and Integrity - Database Disclosure - Data Mining and Big Data.

UNIT – IV: PRIVACY IN CYBERSPACE
Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy – Data Mining - Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies - Where the Field Is Headed.

UNIT – V: MANAGEMENT AND INCIDENTS
Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis - Dealing with Disaster - Emerging Technologies - The Internet of Things - Economics - Electronic Voting - Cyber Warfare. Cyberspace and the Law - International Laws – Cybercrime - Cyber Warfare and Home Land Security.

TEXT BOOK:
Security in Computing, Charles P. Pfleeger Shari Lawrence P fleeger Jonathan Margulies, 5th Edition, Pearson Education, 2015.

REFERENCE BOOKS:
1. *Cyber Security for Dummies,* Joseph Steinberg, Wiley, 2020.
2. *Cyber Space and Cyber Security,* George K. Kostopoulous, CRC Press, 2013.
3. *Cyber Security: Analytics, Technology and Automation,* MarttiLehto, Pekka Neittaanmäki, edited, Springer International Publishing, Switzerland, 2015.
4. *Computer Forensics and Investigations,* Nelson Phillips and Enfinger Steuart, Cengage Learning, New Delhi, 2009.

DIGITAL TOOLS:
- **https://www.w3schools.com/cybersecurity/index.php**
- **https://www.simplilearn.com/tutorials/cyber-security-tutorial/cyber-security-for-beginners**
- **https://intellipaat.com/blog/tutorial/ethical-hacking-cyber-security-tutorial/**

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO3	2	2	2	2	2	3	3	3	2	3	3	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	3	3
CO5	2	3	3	3	3	3	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. K. ANURATHA

Passed in the BOS Meeting held on 19/03/2022   **Signature of the Chairman**

SOURASHTRA COLLEGE, MADURAI– 625004
(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)
MASTER OF COMPUTER APPLICATIONS (M.C.A)
SYLLABUS (Under CBCS based on OBE)
(with effect from 2021 – 2022)

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE32	**ARTIFICIAL INTELLIGENCE**	**PE**	**4**	**-**	**4**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**III**	**25**	**75**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:
This course helps the student to develop the software by using artificial intelligence technique, which is most needed technology today. This course elaborately discusses about machine learning and its techniques.

COURSE OBJECTIVES:
- To enable the students to learn the basic functions of AI, Heuristic Search Techniques.
- To provide knowledge on concepts of Representations and Mappings and Predicate Logic.
- To introduce Machine Learning with respect Data Mining, BigData and Cloud.
- To enable the students study about Applications& Impact of ML.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Demonstrate AI problems and techniques.	**Upto K5**
CO 2	Understand machine learning concepts.	**Upto K5**
CO 3	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	**Upto K5**
CO 4	Analyze the impact of machine learning on applications.	**Upto K5**
CO 5	Analyze and design are AI-world problem for implementation and understand the dynamic behavior of a system.	**Upto K5**

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE

Passed in the BOS Meeting held on 19/03/2022   **Signature of the Chairman**

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MASTER OF COMPUTER APPLICATIONS (M.C.A)
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ARTIFICIAL INTELLIGENCE

UNIT – I:
Introduction: AI Problems - Al techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search.

UNIT –II:
Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations – Frame Problem.

UNIT –III:
Using Predicate logic: Representing simple facts in logic-Representing Instance and ISA relationships - Computable functions and predicates – Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.

UNIT – IV:
Advanced topics for AI Problem Solving: Automated Reasoning: Introduction to Weak Methods in Theorem Proving - The General Problem Solver and Difference Tables - Resolution Theorem Proving - PROLOG and Automated Reasoning - Further Issues in Automated Reasoning.

UNIT – V:
Understanding Natural language: The Natural Language Understanding Problem - Deconstructing Language: A Symbolic Analysis – Syntax - Syntax and Knowledge with ATN Parsers - Stochastic Tools for Language Analysis - Natural Language Applications.

TEXTBOOKS:
1. *Artificial Intelligence,* Elaine Rich and Kevin Knight, Tata McGraw Hill Publishers company Pvt Ltd, 3rd Edition, 2009.
2. *Artificial Intelligence,* George F Luger, 4th Edition, Pearson Education, 2002.

REFERENCEBOOK:
Artificial Intelligence a Modern Approach, Stuart Russell and Peter Norvig, 4th Edition, Pearson Series, 2010.

DIGITAL TOOLS:
Related Online Contents [MOOC, SWAYAM,NPTEL, Websites etc.]
- https://www.ibm.com/downloads/cas/GB8ZMQZ3
- https://www.javatpoint.com/artificial-intelligence-tutorial
- https://nptel.ac.in/courses/106/105/106105077/

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO3	3	3	3	3	2	3	1	3	3	3	3	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	2	3	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Prof. O. K. HARIHARAN

Passed in the BOS Meeting held on 19/03/2022   **Signature of the Chairman**

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MASTER OF COMPUTER APPLICATIONS (M.C.A)
SYLLABUS (Under CBCS based on OBE)
(with effect from 2021 – 2022)

COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE33	HUMAN RESOURCE MANAGEMENT	PE	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	25	75	100

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

      The course is designed to provide various concepts on human resource management and its practices.

COURSE OBJECTIVES:
- To introduce HRM
- To provide various concepts related to acquiring human resource.
- To demonstrate recruitment and selection process.
- To identify proper methods in training.
- To express quality work life and E-HR.

COURSE OUTCOMES (COs):

      After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Explain the HRM model and concepts.	Upto K5
CO 2	Understand and describes about HR planning, job design and analysis.	Upto K5
CO 3	Analyse and forecast the recruitment and selection process.	Upto K5
CO 4	Examine the role of Trade unions.	Upto K5
CO 5	Evaluate QWL and analyse e-activities.	Upto K5

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE**

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HUMAN RESOURCE MANAGEMENT

UNIT – I:
Introduction – HRM and personnel management – difference between HRM and personnel management – definition of HRM – functions of HRM – managerial functions – nature and scope of HRM – importance of HRM- role of HR manager – objectives of HRM – HRM as a profession – HRM is both a science and art – organization of HR department – HRM model – evolution of HRM

UNIT – II:
HR planning – concepts – importance – responsibility for HR planning – process – forecasting needs for HR – techniques for HR needs. Job design – factors of job design – job redesign. Job analysis – process - methods of information collection for job analysis – job descriptions – job specifications.

UNIT – III:
Requirement – concepts – policy – factors affecting requirement policy and program – process – planning – sources. Selection – concepts – process – test – type of interview – steps in interview process

UNIT – IV:
Training – meaning – need – importance – essentials – process – methods. Trade unions – meaning – definition – characteristic features – need – function – importance – provinces of act 1926 – duties and liabilities of registered trade union – problems of trade union movement in India – measures to strengthen trade union.

UNIT – V:
Quality work life – meaning – definition – factor responsible for the growth of QWL – criteria for measuring QWL – benefits of QWL. The e-HR – nature – activities – e-HR recruitments – e-performance management – e-leaning – e-compensation

TEXT BOOKS:
1. *Human Resource Management*, Prasad L.M, Sultan Chand & Sons, New Delhi (Reprint 2009)
2. *Human Resource Management – text and cases,* Aswathappa K, (2007), Tata McGraw- Hill, New Delhi.

REFERENCE BOOK:
Human Resource Management, Jayasankar J, 2015, Margham publications, Chennai.

DIGITAL TOOLS:
1. https://saylordotorg.github.io/text_human-resource-management/s05-the-role-of-human-resources.html#:~:text=Human%20resource%20management%20(HRM)The,relating%20to%20them%2C%20and%20developing
2. https://www.whatishumanresource.com/human-resource-planning

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	3	3	2	3	2	3	3	2	2	2	2
CO2	1	2	3	2	2	3	1	3	3	2	2	2	2
CO3	1	2	3	3	3	3	1	3	3	3	2	2	2
CO4	1	2	3	3	3	3	2	3	3	3	2	2	2
CO5	2	2	3	3	3	3	2	3	3	3	2	2	2

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. N. M. MEKALA

Passed in the BOS Meeting held on 19/03/2022   **Signature of the Chairman**

SOURASHTRA COLLEGE, MADURAI– 625004
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MASTER OF COMPUTER APPLICATIONS (M.C.A)
SYLLABUS (Under CBCS based on OBE)
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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE34	**GRAPH THEORY**	**PE**	**4**	**-**	**4**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**III**	**25**	**75**	**100**

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

This course provides a basic knowledge of the structure of graphs and the techniques used to analyze problems in graph theory.

COURSE OBJECTIVES:
- To understand the fundamental concepts in Graph theory.
- To define how graphs, serve as models for many standard problems.
- To equip the student with algorithmic techniques that may be used to solve a host of very practical real-world problems.
- To understand the ubiquitous usage of Graph theory in different domains.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Write precise & accurate mathematical definitions of graph theory.	**Upto K5**
CO 2	Apply the principles and concepts of graph theory in practical situations.	**Upto K5**
CO 3	Solve the problems using the concepts of Graphs and trees.	**Upto K5**
CO 4	Validate and critically assess a mathematical proof.	**Upto K5**
CO 5	Explore the modern applications of graph theory.	**Upto K5**

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE

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GRAPH THEORY

UNIT – I:

INTRODUCTION: What is a Graph? - Application of Graphs - Finite and Infinite Graphs - Incidence and Degree - Isolated Vertex, Pendant Vertex, and Null Graph. **PATHS AND CIRCUITS:** Isomorphism - Subgraphs - Walks, Paths, and Circuits, Connected Graphs, Disconnected Graphs, and Components - Euler Graphs - Hamiltonian Paths and Circuits.

UNIT – II:

TREES AND FUNDAMENTAL CIRCUITS: Trees - Some Properties of Trees-Pendant Vertices in a Tree - Distance and Centers in a Tree - Rooted and Binary Tree - On Counting Trees – Spanning Trees - Definition of Fundamental Circuits & Spanning tress – Prim's & Kruskal's algorithm for finding the Shortest Spanning tree. **CUT-SETS AND CUT-VERTICES:** Cut-Sets - Some Properties of a Cut-Set - Fundamental Circuits and Cut-Sets - Connectivity and Separability.

UNIT – III:

PLANAR AND DUAL GRAPHS: Combinatorial Vs. Geometric Graphs - Planar Graphs - Kuratowski's Two Graphs - Different Representations of a Planar Graph - Detection of Planarity - Geometric Dual - Thickness and Crossings. **MATRIX REPRESENTATION OF GRAPHS (ONLY DEFINITIONS):** Incidence Matrix - Circuit Matrix - Cut-Set Matrix - Path Matrix – Adjacency Matrix

UNIT – IV:

COLORING, COVERING, AND PARTITIONING: Chromatic Number - Chromatic Partitioning - Chromatic Polynomial – The Four Color Problem **DIRECTED GRAPHS**: What is a Directed Graph? - Some Types of Diagraphs - Digraphs and Binary Relations - Directed Paths and Connectedness - Euler Digraphs - Trees with Directed Edges - Fundamental Circuits in Digraphs - Paired Comparisons and tournaments.

UNIT – V:

ENUMERATION OF GRAPHS: A type of Enumeration - Counting Labeled Trees - Polya's Counting Theorem. **GRAPH THEORETIC ALGORITHMS AND COMPUTER PROGRAMS:** Algorithms Input: Computer Representation of a Graph - The Output - Some Basic Algorithms - Connectedness – Spanning tree - Shortest – Path Algorithms.

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TEXT BOOK:

1. *Graph Theory with Applications to Engineering and Computer Science,* Narsingh Deo, Prentice Hall of India., New Delhi, 2013.

REFERENCE BOOKS:
1. *Graph Theory,* Prof. S. Kumaravelu & Prof. Susheela Kumaravelu.
2. *A First Course in Graph Theory,* S.A. Choudum, Macmillan.

ONLINESOURCES:
1. https://www.britannica.com/topic/graph-theory
2. https://scanftree.com/Graph-Theory.

Mapping of CO with PO and PSO

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO2	3	3	3	2	2	3	1	3	3	2	3	3	3
CO3	3	3	3	3	3	3	1	3	3	3	3	3	3
CO4	3	3	3	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	3	3	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Prof. N. H. SARAVANAN

Passed in the BOS Meeting held on 19/03/2022   **Signature of the Chairman**

SOURASHTRA COLLEGE, MADURAI– 625004

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAP31	**DATA ANALYTICS USING PYTHON & R – LAB**	PC	-	4	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**III**	**40**	**60**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	✓

COURSE DESCRIPTION:

This course provides information about two powerful Data Analytics technologies. Together, these two technologies (Python & R) provide a powerful platform for building database-driven Web applications.

COURSE OBJECTIVES:

- To understand the basic constructs in Python and R programming.
- To develop applications using OOPs, files and exception handling in Pyhton.
- To analyze statistical operations in R programming.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Create programs using the basic concepts such as data types, Control Statements in Python.	**Upto K5**
CO 2	Create programs using the concepts such as Arrays, Strings, and Functions in Python.	**Upto K5**
CO 3	Create programs using the concepts such as Classes and Objects, Inheritance and Exception.	**Upto K5**
CO 4	Understand and use R – Data types, Data structures.	**Upto K5**
CO 5	Develop programming logic using R Packages and analyse data sets using R programming capabilities.	**Upto K5**

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

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DATA ANALYTICS USING PYTHON & R – LAB

LAB LIST

1. Python Program for implementing the following concept:

   Basic Data types, List, Tuple, Set, Dictionary and Range

2. Python Program to implement 'Control Statements'.
3. Python Program to implement Arrays, Strings and functions.
4. Python Program using 'Classes and Objects', 'Inheritance and Polymorphism' and 'Exceptions'.
5. Write a program to implement basics of R-Programming
   (Data types, Variables, Operators etc,.)
6. Write a program to find list of even numbers from 1 to n using R-Loops.
7. Create a function to print squares of numbers in sequence.
8. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.
9. Implement different String Manipulation functions in R.
10. Implement different data structures in R (Vectors, Lists, Data Frames)
11. Write a program to read a csv file and analyze the data in the file in R.
12. Create pie chart and bar chart using R.
13. Create a data set and do statistical analysis on the data using R.

DIGITAL TOOLS:
- http://www.sthda.com/english/wiki/r-basics-quick-and-easy
- https://www.w3schools.com/r/
- https://www.tutorialspoint.com/r/index.htm
- https://www.guru99.com/r-tutorial.html
- https://www.learn-r.org/r-tutorial/r-examples.php
- https://www.programiz.com/python-programming/examples
- https://www.geeksforgeeks.org/python-programming-examples/
- https://www.tutorialgateway.org/python-programming-examples/
- NPTEL course: Python for data science

Mapping of CO with PO and PSO

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO4	2	2	2	2	2	3	2	3	2	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. K. ANURATHA

Passed in the BOS Meeting held on 19/03/2022   **Signature of the Chairman**

SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B+' grade by NAAC)

MASTER OF COMPUTER APPLICATIONS (M.C.A)
SYLLABUS (Under CBCS based on OBE)
(with effect from 2021 – 2022)

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAP32	**WEB PROGRAMMING – LAB**	**PC**	**-**	**2**	**2**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**III**	**40**	**60**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	✓

COURSE DESCRIPTION:

This course provides information about two powerful technologies. Together, these two technologies provide a powerful platform for building database-driven Web applications.

COURSE OBJECTIVES:
- To understand how client side and server-side programming works on the web.
- To Test, debug and deploy web pages containing PHP and MySQL.
- To create, read and process data in a MySQL database.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Create web pages using basic HTML5 tags.	**Upto K5**
CO 2	Design web pages using scripting languages	**Upto K5**
CO 3	Use PHP built-in functions and custom functions for processing.	**Upto K5**
CO 4	Develop various interactive and dynamic websites.	**Upto K5**
CO 5	Customize with validation process in your web site.	**Upto K5**

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE**

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WEB PROGRAMMING - LAB

LAB LIST

1. Basic programs using HTML5 and CSS3.

2. Program for creating websites using frame.

3. Program for implementing functions like mathematical and string functions using JavaScript.

4. Program for Validating Registration Form using JavaScript.

5. Program to create Login form using PHP and MYSQL.

6. Program for online quiz using PHP and MYSQL.

7. Programs for manipulating MYSQL database

8. Program for Cookie manipulation using PHP.

9. Program for Session manipulation using PHP.

DIGITAL TOOLS:
https://www.halvorsen.blog/documents/programming/web/web.php
https://www.makeuseof.com/tag/simple-html-code-learn-minutes/
https://www.geeksforgeeks.org/programming-for-beginners-10-best-html-coding-practices-you-must-know/
https://www.phptpoint.com/php-tutorial/
https://www.guru99.com/php-tutorials.html
https://alexwebdevelop.com/how-to-learn-php/

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	2	2	2	2	2	2	2	2	2	2	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. K. ANURATHA

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAP33	**ANGULAR JS - LAB**	**PC**	**-**	**2**	**2**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**III**	**40**	**60**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	✓

COURSE DESCRIPTION:
        This course provides information about Angular JS, a structural framework for creating dynamic web applications.

COURSE OBJECTIVES:
- To learn for reducing the amount of code and to build rich user interface applications.
- To increase the reliability and maintainability of UI by using data binding.
- To retrieve data from back-end server, manipulate it and display it with ease.
- To understand how to modularize code with the custom services and directives.
- To create Single Page Applications (SPA).

COURSE OUTCOMES (COs):
        After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Create a basic sample application in Angular JS.	**Upto K5**
CO 2	Develop an application using concepts such as models and controllers in Angular JS.	**Upto K5**
CO 3	Develop an application using built-in and custom directives.	**Upto K5**
CO 4	Develop a web application using Routing in Angular JS.	**Upto K5**
CO 5	Develop single page applications using AJAX with angularjs.	**Upto K5**

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

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ANGULAR JS - LAB
LAB LIST

1. Create a simple application using Angular JS.

2. Use of Directives in Angular JS.

3. Use of Expressions in Angular JS.

4. Creating Controllers in Angular JS.

5. Implementation of Filters in Angular JS.

6. Creating Tables in Angular JS.

7. Creating Modules in Angular JS.

8. Creating Angular JS application using Forms and validation.

9. Creating Angular JS application using Includes.

10. Creating Angular JS application using Scope.

11. Creating Angular JS application using Services.

12. Creating Angular JS applications with AJAX.

DIGITAL TOOLS:
https://www.guru99.com/angularjs-tutorial.html
https://www.tutorialsteacher.com/angularjs/angularjs-tutorials
https://www.tutorialspoint.com/angularjs/index.htm
https://docs.angularjs.org/tutorial
https://www.w3schools.com/angular/

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	3	2	3	2	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. K. ANURATHA

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAN31	**MANAGEMENT INFORMATION SYSTEM**	**NME**	**4**	**-**	**3**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**III**	**25**	**75**	**100**

NATURE OF COURSE	Employability		Skill Oriented	✓	Entrepreneurship	

COURSE DESCRIPTION:

      To acquire the knowledge about the basic of concept of Information System and the implementation methods. To learn about categories of computers, infra structures, communication channels and databases.

COURSE OBJECTIVES:
1. To gain the knowledge about Information System.
2. To give the knowledge about e-commerce and tele communication.
3. To make the students learn about various database models.

COURSE OUTCOMES (COs):

      After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Attain the knowledge about the Information System.	**Upto K5**
CO 2	Know about update of Computers and its components.	**Upto K5**
CO 3	Understand about the Telecommunication channels.	**Upto K5**
CO 4	Gain knowledge about E-commerce.	**Upto K5**
CO 5	Learn about concept of database and its types.	**Upto K5**

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

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MANAGEMENT INFORMATION SYSTEM

UNIT – I:
Introduction – Concept of MIS – Definition – Components of MIS – Nature & Scope of MIS.

UNIT – II:
Introduction – Computer system – Computer Categories – Evolution – IT infrastructure – Components – Computer H/W.

UNIT – III:
Introduction – Ecommerce – Sale life cycle, infrastructure, Application, payment system – E -Business – E – Governance.

UNIT – IV:
Introduction – Telecommunication – Type of singles – Communication Channel – Characteristic of channel – Communication Hardware, Network – Computer Network of India – Internet – connectivity – Capabilities – Application of Communication.

UNIT – V:
Database Concept – File Traditional approach – Database Modern approach – Data Model – Network, Hierarchical, Relational, Object Oriented and Multidimensional – E R Diagram – Data ware Hardware.

TEXT BOOK:
Management Information System, DP Goyal, 4th edition, Vikas Publication house Pvt. Ltd. 2014.

REFERENCE BOOKS:
1. *Management Information Systems,* Jawadekar, W. S. (2004), Tata McGraw Hill.
2. *Management Information System*, Dr. S.P. Rajagopalan, 2012.

DIGITAL TOOLS:
- https://www.tutorialspoint.com/computer_fundamentals/computer_components.htm
- https://www.crucial.in/articles/pc-builders/what-is-computer-hardware
- https://www.studytonight.com/dbms/database-model.php

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	3	2	2	1	2	2	2	2	2	2
CO2	2	3	3	3	3	2	1	3	3	3	2	2	2
CO3	2	3	3	3	2	2	1	3	3	3	3	3	3
CO4	2	3	3	3	3	2	2	3	3	3	3	3	3
CO5	2	3	3	3	2	2	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Prof. T. S. B. ARUNPRASANTH

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCACV1	MINI PROJECT	EEC	-	2	2

.

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	III	40	60	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:

This course aims to make the students understand the real time software development environment. The student should gain an in-depth knowledge in the selected problem, and the language/software, which is used by them.

COURSE OBJECTIVES:
- To solve simple real-time problems in the following fields Industry/Academic Institutions/Computer science.
- To help the students do project (Commercial or Technical) individually or combined.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Have hands of experience on innovation, record keeping, documentation etc. And promote them as entrepreneur.	K3 to K5
CO 2	Learn to develop solution and apply the technologies learnt during the course in the real-time projects.	K3 to K5
CO 3	Learn how to plan various work in the project development environments involving deadlines and teamwork.	K3 to K5
CO 4	Get a chance for preparing for main project.	K3 to K5
CO 5	Prepare technical report based on the project and deliver seminar on their work.	K3 to K5

K3 – APPLY, K4 – ANALYSE, K5– EVALUATE
Mapping of CO with PO and PSO

CO	Program Outcome										Program Specific Outcome		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	3	3	2	3	3	3
CO2	3	3	2	3	2	3	3	3	3	2	3	3	3
CO3	3	3	2	3	2	3	3	3	3	2	3	3	3
CO4	2	2	2	2	2	2	2	2	2	2	3	3	3
CO5	3	3	2	3	2	3	3	3	3	2	3	3	3

3. Advanced Application 2. Intermediate Development 1. Introductory Level

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COURSE STRUCTURE – IV SEMESTER

Course code	Name of the Course	Category	Hrs./Week	Credits	Exam/Hrs.	CA	SE	Total Marks	Focus on Employability, Entrepreneurship / Skill development
21MCAC41	**Core – 14:** Internet of Things	PC	4	3	3	25	75	100	Employability
Elective		PE	6	4	3	25	75	100	Employability
21MCAE41	1. Statistics for Data Science								
21MCAE42	2. Machine Learning								
21MCAE43	3. Digital Image Processing								
21MCAE44	4. Digital Marketing								
21MCACV2	Project	EEC	20	12	-	40	60	100	Employability, Entrepreneurship / Skill Development
Total			**30**	**19**		**90**	**210**	**300**	

One Elective paper has to be chosen out of four Electives

PC –Programme Core   **PE** – Professional Electives

EEC –Employability Enhancement courses   **SL** – Self-phased Learning

CA –Class Assessment (Internal)   **SE** – Summative Examination

NME –Non –Major Elective   **T** –Theory   **P** –Practical

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAC41	INTERNET OF THINGS	PC	4	-	3

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	✓

COURSE DESCRIPTION:

This course aims to provide a basic understanding of Internet of Things. It offers hands on training for building simple applications using appropriate sensors, microcontroller board and other components.

COURSE OBJECTIVES:

- To understand the underlying concepts of Internet of Things (IoT)
- To know the challenges and future directions of IoT.
- To distinguish various applications in IoT.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Define Internet of Things & its characteristics and iot enabling technologies.	Upto K5
CO 2	Describe the differences and similarities between iot & M2M and managing iot systems.	Upto K5
CO 3	Understand iot Platform design methodology and developing iot System using Python.	Upto K5
CO 4	Identify the various iot physical components, server and cloud.	Upto K5
CO 5	Demonstrate Data Analytics for iot.	Upto K5

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE

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INTERNET OF THINGS

UNIT – I:

Introduction to Internet of Things: Introduction – physical design of IoT – Logical design of IoT – IoT enabling technologies – IoT levels & deployment templates.

Domain Specific IoTs: Introduction – Home automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Lifestyle.

UNIT – II:

IoT and M2M: Introduction – M2M – difference between IoT and M2M – SDN and NFV for IoT.

IoT System Management with NETCONF-YANG: Need for IoT management – SNMP – network operator requirements – IoT system management with NETCONF-YANG.

UNIT – III:

IoT Platforms Design Methodology: Introduction – IoT design methodology – case study on IoT system for weather monitoring.

IoT Systems – Logical Design using Python: - Introduction – installing python – data types – data structure – control flow – functions – modules – packages – file handling – data & time operations – classes – packages for IoT.

UNIT – IV:

IoT Physical Devices & Endpoints: IoT device definition – Raspberry Pi – about the board – Linux on raspberry Pi – raspberry Pi interfaces – programming raspberry Pi with python – other IoT devices.

IoT Physical Servers & Cloud Offerings Introduction – WAMP – Xively – Django – designing a REST ful Web API – Amazon web services for IoT.

UNIT – V:

Data Analytics for IoT: Introduction – Apache Hadoop – Using Hadoop MapReduce for batch data analysis – Apache Oozie – Apache Spark – Apache Storm – using Apache Storm for real time data analysis.

Case studies illustrating IoT Design: Introduction – Home Automation.

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TEXT BOOK:

Internet of Things – A hands on Approach, Arshdeep Bahga, Vijay Madisetti, University Press, Hyderabad, 2018.

REFERENCE BOOKS:

1. *The Internet of Things: Do-It-Yourself at Home Projects for Raspberry Pi and BeagleBone Black,* Donald Norris Arduino, Mc.Graw Hill,2015.
2. *Getting Started with the Internet of Things,* CunoPfister, O'Reilly Media, Inc.,2011
3. *The Internet of Things in the Cloud: A Middleware Perspective,* Honbo Zhou, Press, 2012
4. *The Internet of Things, Key applications and Protocols,* Olivier Hersent, David Boswarthick, Omar Elloumi, Wiley, 2012

DIGITAL TOOLS:

- https://www.javatpoint.com/iot-internet-of-things
- https://www.guru99.com/iot-tutorial.html
- https://azure.microsoft.com/en-us/overview/internet-of-things-iot/what-is-the-internet-of-things/#overview
- http://www.microsoft.com/en-in/server-cloud/internet-of-things.aspx

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	3	2	3	2	3	3	3	3
CO2	3	3	2	3	2	3	2	3	3	3	3	3	3
CO3	2	3	2	3	2	3	2	3	2	3	3	3	3
CO4	3	3	2	3	2	3	2	3	2	3	3	3	3
CO5	3	3	3	3	2	3	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. K. ANURATHA

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE41	STATISTICS FOR DATA SCIENCE	PE	6	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION
    This course is designed to introduce the basic principles of statistical methods and procedures used for data analysis.

COURSE OBJECTIVE
- To understand crucial topics in statistics including - data gathering, summarizing data using descriptive statistics, displaying and visualizing data.
- To acquire an understanding of the concepts of sampling distribution and statistical reliability.

COURSE OUTCOMES (COs):
    After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Become familiar with the basic terminology and special notation of statistical analysis.	Upto K5
CO 2	Learn how statistical techniques fit into the general process of science	Upto K5
CO 3	Learn the notation, particularly summation notation	Upto K5
CO 4	Understand the concept of a frequency distribution	Upto K5
CO 5	Organize data into a regular or a grouped frequency distribution table, and understand data that are presented in a table.	Upto K5

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

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STATISTICS FOR DATA SCIENCE

UNIT – I:
Introduction: Origin & Development of Statistics - Definition of Statistics - Importance and Scope of Statistics - Limitations of Statistics - **Measures of Central Tendency:** Frequency Distribution – Averages - Arithmetic Mean - Median - Mode - Geometric Mean - Harmonic Mean.

UNIT – II:
Dispersion: Measures of Dispersion – Coefficient of Dispersion - Moments - Skewness and Kurtosis.

UNIT – III:
Theory of Probability: Basic Terminologies – classical probability – mathematical tools – Axiomatic approach to Probability –Theorems on probability – conditional probability – independent events – multiplication theorem of probability.

UNIT – IV:
Random Variables and Distribution Function: Introduction - Random Variable – Distribution function – Discrete random variable – probability mass function – Continuous random variable – continuous distribution function.
Special Distribution (Problems only)**:** Binomial Distribution – Poisson distribution – Normal Distribution.

UNIT – V:
Correlation and Regression: Karl Pearson's Coefficient of Correlation – Rank Correlation – Linear Regression – curvilinear regression.

TEXT BOOK:
Fundamentals of Mathematical Statistics, Gupta, S.C. and Kapoor, V.K., Sultan Chand & Sons, New Delhi, 11th edition, 2002.
***Given headings only in the syllabus.**
REFERENCE BOOKS:
1. *The elements of Statistical Learning,* Hastie, Trevor, et al., Springer, 2009.
2. *Introduction to Probability and Statistics,* Ross, S.M., Academic Foundation, 2011.
3. *Probability, Random Variables and Stochastic Processes,* Papoulis, A. and Pillai, S.U., TMH, 2010.

DIGITAL TOOLS:
- https://stattrek.com/tutorials/probability-tutorial.aspx
- https://www.tutorialspoint.com/statistics/probability.htm
- https://intellipaat.com/blog/tutorial/statistics-and-probability-tutorial/introduction/

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO3	2	3	2	3	2	3	2	3	2	3	3	3	3
CO4	2	3	2	3	2	3	2	3	2	3	3	3	3
CO5	2	3	2	3	2	3	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Prof. N. H. SARAVANAN

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE42	MACHINE LEARNING	PE	4	-	4

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	25	75	100

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

This course provides a concise introduction to the fundamental concepts in machine learning and popular machine learning algorithms.

COURSE OBJECTIVES:

- To understand the basic theory underlying machine learning.
- To be able to formulate machine learning problems corresponding to different applications.
- To be able to design and implement various machine learning algorithms in a range of real-world applications.

COURSE OUTCOMES (COs):

After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Become familiar with Machine Learning concepts, classifications of Machine Learning.	Upto K5
CO 2	Describe Supervised Learning concepts.	Upto K5
CO 3	Define Statistical Learning concepts.	Upto K5
CO 4	Explain Support Vector Machine concepts.	Upto K5
CO 5	Discuss simple Machine Learning applications in a range of real-world applications.	Upto K5

**K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE**

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SOURASHTRA COLLEGE, MADURAI– 625004
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MASTER OF COMPUTER APPLICATIONS (M.C.A)
SYLLABUS (Under CBCS based on OBE)
(with effect from 2021 – 2022)

MACHINE LEARNING

UNIT – I:
Introduction to machine learning: Machine learning – Machine learning vs. Traditional learning – how machine learning works – applications of machine learning – types of learning – challenges in machine learning. Regression: Introduction – types of regression – linear regression – multiple linear regression – non-linear regression – logistic regression.

UNIT – II:
Classification: Introduction – decision trees – naïve bayes classification – multinomial naïve bayes classification – support vector machines – k-nearest neighbours – random forest.

UNIT – III:
Cluster analysis: Introduction – requirements of clustering – types of data in cluster analysis – categorization of major clustering methods – partitioning methods – hierarchical methods – density-based methods.

UNIT – IV:
Semi-supervised, reinforcement and active learning: Introduction – semi-supervised learning – reinforcement learning – active learning.

UNIT – V:
Deep learning: Introduction – Applications of deep learning – deep learning process – types of deep learning networks – limitations of deep learning.

TEXT BOOK:
Introduction to Machine learning, Dr. Jeeva Jose, Khanna book publishing company, New Delhi, 2020.

REFERENCE BOOKS:
1. *Pattern Recognition and Machine Learning*, Christopher Bishop, Springer, 2007.
2. *Machine Learning: A Probabilistic Perspective*, Kevin Murphy, MIT Press, 2012.
3. *The Elements of Statistical Learning*, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer 2009 (freely available online).

DIGITAL TOOLS:
- https://www.kaggle.com/kanncaa1/machine-learning-tutorial-for-beginners
- https://www.mygreatlearning.com/blog/machine-learning-tutorial/
- https://www.simplilearn.com/tutorials/machine-learning-tutorial

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	3	2	3	2	3	2	3	2	3	3	3	3
CO2	2	3	2	3	2	3	2	3	2	3	3	3	3
CO3	2	3	2	3	2	3	2	3	2	3	3	3	3
CO4	3	3	3	3	2	3	2	3	3	3	3	3	3
CO5	2	3	2	3	2	3	2	3	3	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Prof. K. R. THANIKASALAM

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE43	**DIGITAL IMAGE PROCESSING**	**PE**	**4**	**-**	**4**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**IV**	**25**	**75**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:

This course aims to provide a basic understanding of Image processing. It focuses image filtering, restoration and compressing techniques.

COURSE OBJECTIVES:
- To understand the fundamentals of image processing.
- To train image transformation and restoration.
- To study colour image processing and compression.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Understand the basics of digital image processing	**Upto K5**
CO 2	Observe image intensity transformation and spatial filtering	**Upto K5**
CO 3	Examine how to filter noise and restoration and reconstruction of images.	**Upto K5**
CO 4	Analyze color image processing.	**Upto K5**
CO 5	Distinguish between various compression techniques.	**Upto K5**

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY,
K4 – ANALYSE, K5– EVALUATE

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DIGITAL IMAGE PROCESSING

UNIT – I: Introduction and Digital Image Fundamentals

Image processing – origin – example – fundamental steps in Image Processing Systems – components of image processing. Elements of visual perception -Image sensing and Acquisition – Sampling and Quantization –Relationships between pixels.

UNIT – II: Intensity Transformation and Spatial Filtering

Background- Intensity transformation function – histogram processing – fundamentals of spatial filtering - Smoothening spatial filters- Sharpening spatial filters.

UNIT – III: Image Restoration and Reconstruction

Model - Restoration in the process of noise only Spatial filtering - mean filters- Order statistic filters- Adaptive filters – Periodic noise reduction by Frequency domain filtering- Band Reject filters - Band pass filter - Notch Filter- Optimum Notch Filtering.

UNIT – IV: Color Image Processing

Color fundamentals – models – pseudo color image processing – full-color image processing – color transformation – smoothing and sharpening – segmentation – noise – color image compression.

UNIT – V: Image Compression

Fundamentals – basic compression methods – digital watermarking. Need for Data Compression – Types of Compression – Binary Image Compression Schemes – Image Compression – Video Compression – Audio Compression.

TEXT BOOK:

Digital Image Processing, Rafael C Gonzalez, Richard E Woods 3rd Edition, Pearson Education, 2016.

REFERENCE BOOKS:

1. *Fundamentals of Digital Image Processing,* A.K. Jain, PHI, New Delhi, 2001.
2. *Digital Image Processing,* William K Pratt, John Willey, 2012.

DIGITAL TOOLS:

https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-Vijaya%20Raghavan.pdf
https://www.geeksforgeeks.org/digital-image-processing-basics/
https://www.javatpoint.com/digital-image-processing-tutorial
https://www.tutorialspoint.com/dip/index.htm

Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO2	2	3	2	3	2	3	2	2	2	3	3	3	3
CO3	2	3	3	3	2	3	2	2	3	3	3	3	3
CO4	3	3	3	3	2	3	2	2	3	3	3	3	3
CO5	2	3	2	3	2	3	2	2	2	3	3	3	3

3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Prof. K. R. THANIKASALAM

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCAE44	**DIGITAL MARKETING**	**PE**	**4**	**-**	**4**

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	**IV**	**25**	**75**	**100**

NATURE OF COURSE	Employability	✓	Skill Oriented		Entrepreneurship	

COURSE DESCRIPTION:
This course provides a deep knowledge about the Digital marketing platforms and the theoretical aspects of creating a website.

COURSE OBJECTIVES:
- To understand the fundamentals of Digital Marketing.
- To learn digital advertising tools.
- To develop effective website and apps.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Explain the concept of digital marketing and Business Models.	**Upto K5**
CO 2	Observe Market sensing and role of social media in digital brand communications	**Upto K5**
CO 3	Discuss the various digital advertising tools like e-mail and online games.	**Upto K5**
CO 4	Develop effective website and apps.	**Upto K5**
CO 5	Recognize social media metrics in Digital Analytics. Planning & Organization of Digital Marketing.	**Upto K5**

K1- KNOWLEDGE (REMEMBERING), K2-UNDERSTANDING, K3 – APPLY, K4 – ANALYSE, K5– EVALUATE

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DIGITAL MARKETING

UNIT – I:

Introduction to Digital Marketing: Definition of Digital Marketing - Digital Marketing versus traditional marketing - Digital Marketing and the Marketing Mix - Digital Marketing in relation to business processes - Development of Digital Marketing - Two important models for Digital Marketing communication.

Strategy and Business Models: Digital Marketing and Strategy - Marketing Strategy - The business model - Determining the impact of new internet technology on Digital Marketing.

UNIT – II:

Market Sensing: Internet usage - Online shopping behaviour - Online buying process and the Digital Marketing funnel - Use of social media - Online Market Research - Big data and customer insights - Relevant trends in Digital Marketing.

Digital Brand Communications: Digital Marketing communication: the basis - Role of Digital Marketing communications in brand management - Role of social media in digital brand communications - Content marketing - Mobile communications.

UNIT – III:

Customer acquisition through owned channel: Using digital communications and sales channels to reach and win customers - Search Engine Marketing - Link-building - Use of social media channels - Email marketing - Marketing automation.

Customer acquisition through paid channel: Digital Marketing communication through paid channels - Paid Search (Pay-Per-Click = PPC) - Online display advertising - Advertising on social networks - Affiliate marketing - Using online games for advertising.

UNIT – IV:

Customer Relationship Management (CRM): Digital customer relationship management - Working with customer groups - Encouraging customer satisfaction and loyalty - Increasing customer value - Individual value propositions - Social CRM.

Designing Effective Websites and Apps: Effectiveness of websites and apps - Influencing the visitor - Website usability - Web content and web text - Interaction and conversion - Effective landing pages - Search Engine Optimisation (SEO) - The development of an effective app.

UNIT – V:

Digital analytics: Definition and starting points -The Digital Marketing funnel translated into performance indicators - Different traffic sources within digital analytics - The ABC Model: The Digital Marketing funnel - Recognising the phase that the visitor is in - Social media metrics - Digital analytics in the organisation.

Organisation565

Planning and Organisation: Organising Digital Marketing activities - Digital Marketing plan - Project management - Security measures against cybercrime - Legal aspects of Digital Marketing.

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TEXT BOOK:
Digital Marketing Fundamentals, Marjolein Visser RM, Berend Sikkenga SMP, Mike Berry, 2nd edition, 2021, Noordhoff Uitgeversbv, Groningen/Utrecht, The Netherlands.

REFERENCE BOOKS:
1. *Digital marketing excellence: planning, optimizing and integrating online marketing,* Chaffey, D., & Smith, P. R. (2017), Taylor & Francis.
2. *The art of digital marketing: the definitive guide to creating strategic, targeted, and measurable online campaigns,* Dodson, I. (2016), John Wiley & Sons.
3. *Understanding Digital Marketing, Marketing strategies for engaging the digital generation,* Damian Ryan, 3rd Edition, 2014, Kogan Page, London Philadelphia, New Delhi.

DIGITAL TOOLS:
https://www.simplilearn.com/tutorials/digital-marketing-tutorial
https://intellipaat.com/blog/digital-marketing-tutorial/
https://www.guru99.com/free-digital-marketing-tutorial.html
https://www.javatpoint.com/digital-marketing

Mapping of CO with PO and PSO

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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3. Advanced Application   2. Intermediate Development   1. Introductory Level

COURSE DESIGNER: Dr. V. K. VIJAYAKUMAR

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COURSE CODE	COURSE TITLE	CATEGORY	T	P	CREDITS
21MCACV2	PROJECT	EEC	-	20	12

YEAR	SEMESTER	INTERNAL	EXTERNAL	TOTAL
II	IV	40	60	100

NATURE OF COURSE	Employability	✓	Skill Oriented	✓	Entrepreneurship	✓

COURSE DESCRIPTION:
This course aims to provide hands on training for building applications/software using appropriate known/needed technologies.

COURSE OBJECTIVES:
- To solve real-time problems in the following fields Industry/Academic Institutions/Computer science.
- It involves practical work for understanding and solving problems in the field of computing.
- Students will do individually Commercial or Technical Project based on their Industry /Academic Institution needs with the known/needed technologies.

COURSE OUTCOMES (COs):
After the completion of the course, the students will be able to

No.	Course Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CO 1	Have hands of experience in analysis of real time case.	K3 to K5
CO 2	Learn to discover potential research areas in the field of Cyberspace.	K3 to K5
CO 3	Learn to conduct a survey of several available literature in the preferred field of study.	K3 to K5
CO 4	Learn to compare and contrast the several existing solutions for research challenges.	K3 to K5
CO 5	Demonstrate an ability to work in teams and manage the conduct of the research study and to get deep knowledge in the known/needed technologies.	K3 to K5

K3 – APPLY, K4 – ANALYSE, K5– EVALUATE
Mapping of CO with PO and PSO

CO	Program Outcomes										Program Specific Outcomes		
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3. Advanced Application   2. Intermediate Development   1. Introductory Level

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