



R.M.K. COLLEGE OF ENGINEERING AND TECHNOLOGY

RSM Nagar, Pudukkottai – 601 206



Course Outcomes ODD Semester 2022-23

| Sl. No. | Semester | Theory/ Practical | Course Code / Course Name |
|---------|----------|-------------------|--|
| 1) | 3 | Theory | 21MA304-Linear Algebra |
| 2) | 3 | Theory | 21AI301-Digital Principles and Computer Architecture |
| 3) | 3 | Theory | 21AI302-Introduction to Data Science (Lab Integrated) |
| 4) | 3 | Theory | 21CS302-Object Oriented Programming |
| 5) | 3 | Theory | 21CS304-Database Management Systems |
| 6) | 3 | Theory | 21GE301-Universal Human Values-II: Understanding Harmony |
| 7) | 3 | Practical | 21CS311-Object Oriented Programming Laboratory |
| 8) | 3 | Practical | 21CS312-Database Management Systems Laboratory |
| 9) | 3 | Practical | 21AI311-Mini Project |
| 10) | 3 | Practical | 21CS314-Aptitude and Coding Skills - I |
| 11) | 5 | Theory | AD8501- Optimization Techniques |
| 12) | 5 | Theory | CW8691- Computer Networks |
| 13) | 5 | Theory | AD8502- Data Exploration and Visualization |
| 14) | 5 | Theory | AD8551- Business Analytics |
| 15) | 5 | Theory | AD8552 - Machine Learning |
| 16) | 5 | Theory | OCE551 – Open Elective - Air Pollution and Control Engineering |
| 17) | 5 | Practical | AD8511-Machine Learning Laboratory |
| 18) | 5 | Practical | AD8512- Mini Project on Data Sciences Pipeline |

EVEN Semester 2022-23

| Sl. No. | Semester | Theory/ Practical | Course Code / Course Name |
|---------|----------|----------------------|---|
| 1) | 4 | Theory | 21MA402-Probability and Statistics |
| 2) | 4 | Theory | 21AI401-Artificial Intelligence |
| 3) | 4 | Theory | 21AI402-Data Analytics |
| 4) | 4 | Theory | 21AI403-Object Oriented Software Engineering |
| 5) | 4 | Theory | 21AI404-Operating System Fundamentals (Lab Integrated) |
| 6) | 4 | Theory | 21CS402-Design and Analysis of Algorithms |
| 7) | 4 | Practical | 21AI411-Artificial Intelligence Laboratory |
| 8) | 4 | Practical | 21AI412-Data Analytics Laboratory |
| 9) | 4 | Practical | 21AI413-Internship |
| 10) | 4 | Practical | 21CS414-Aptitude and Coding Skills – II |
| 11) | 6 | Theory | AD8601- Artificial Intelligence II |
| 12) | 6 | Theory | AD8602 - Data and Information Security |
| 13) | 6 | Theory | IT8501- Web Technology |
| 14) | 6 | Theory | 20AI604-Knowledge Engineering |
| 15) | 6 | Theory | CW8591 – Professional Elective Software Architecture |
| 16) | 6 | Theory | AD8007 – Professional Elective Software Testing and Quality Assurance |
| 17) | 6 | Practical | IT8511- Web Technology Laboratory |
| 18) | 6 | Practical | AD8611- Artificial Intelligence - II Laboratory |
| 19) | 6 | Practical | HS8581 - Professional Communication |
| 20) | 6 | Practical | AD8612- Socially relevant Project |

ODD Semester 2022-23

3rd Semester – B.Tech. Artificial Intelligence and Data Science

| 21MA305-Linear Algebra | |
|------------------------|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Test the consistency and solve the system of linear equations. |
| CO2 | Identify the bases and dimensions of vector space. |
| CO3 | Demonstrate the accurate and efficient use of advanced algebraic techniques. |
| CO4 | Compute orthonormal basis of inner product space and least squares approximation. |
| CO5 | Evaluate the eigenvalues of a matrix using numerical techniques and perform matrix decomposition. |

| 21AI301-Digital Principles and Computer Architecture | |
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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Design digital circuits using simplified boolean functions. |
| CO2 | Design combinational circuits and sequential circuits |
| CO3 | Interpret the basic structure and operation of a computer, instructions and addressing mode. |
| CO4 | Construct a basic processor with pipeline. |
| CO5 | Evaluate the memory hierarchical system including cache memory and virtual memory. |
| CO6 | Differentiate the different ways of communicating with I/O devices and I/O interfaces. |

| 21AI302-Introduction to Data Science (Lab Integrated) | |
|---|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the fundamentals of data science |
| CO2 | Experiment python libraries for data science |
| CO3 | Apply and implement basic classification algorithms |
| CO4 | Implement clustering and outlier detection approaches |
| CO5 | Present and interpret data using visualization tools in Python |

| 21CS302-Object Oriented Programming | |
|-------------------------------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the core object oriented programming concepts. |
| CO2 | Develop Java programs using object oriented programming concepts. |
| CO3 | Apply design principles to create modular and reusable code that enhances scalability. |
| CO4 | Implement exception handling and debugging techniques to ensure program reliability. |
| CO5 | Develop interactive Java applications using event handling mechanism. |
| CO6 | Build projects using object oriented programming paradigm. |

21CS304-Database Management Systems

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Implement SQL and effective relational database design concepts.

CO2 Map ER model to Relational model to perform database design effectively.

CO3 Compare and contrast various indexing strategies in different database systems.

CO4 Implement queries using normalization criteria and optimization techniques.

CO5 Analyse how advanced databases differ from traditional databases.

CO6 Design and deploy an efficient and scalable data storage node for varied kind of application requirements.

21GE301-Universal Human Values-II: Understanding Harmony

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Would become more aware of themselves, and their surroundings (family, society, nature);

CO2 Would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

CO3 Would have better critical ability.

CO4 Would become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

CO5 Would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Laboratory

21CS311-Object Oriented Programming Laboratory

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Develop and implement Java programs for simple applications that make use of classes, packages and interfaces.

CO2 Develop and implement Java programs with collections, exception handling, regular expressions and multithreading.

CO3 Design applications using file processing and event handling

CO4 Build miniprojects by using object oriented concepts.

CO5 Apply code reusability to develop applications.

CO6 Illustrate generic programming in manipulating strings.

21CS312-Database Management Systems Laboratory

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|-----|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Apply typical data definitions and manipulation commands. |
| CO2 | Design applications to test Nested and Join Queries. |
| CO3 | Implement simple applications that use Views. |
| CO4 | Implement applications that require a Front-end Tool. |
| CO5 | Critically analyze the use of Tables, Views, Functions and Procedures. |

21AI311-Mini Project

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|-----|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Define the problem statement, study of requirements; study related Literature and the possible feasibilities. |
| CO2 | Demonstrate a sound technical knowledge of their selected project domain. |
| CO3 | Analyze the problem statement and design the architecture and modules for the proposed system |
| CO4 | Implement the problem and test the project with various test cases |
| CO5 | Demonstrate the knowledge, skills and attitudes of a software professional |
| CO6 | To take up challenging real world problems and find solution using appropriate methodology. |

21CS314-Aptitude and Coding Skills - I

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|------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1: | Develop vocabulary for effective communication skills. |
| CO2: | Build the logical reasoning enhance critical thinking. |
| CO3: | Develop error correction and debugging skills in programming. |
| CO4: | Apply programming skills to develop programs efficiently |
| CO5: | Solve problems using quantitative skills |
| CO6: | Develop effective reading and listening skills |

5th Semester – B.Tech. Artificial Intelligence and Data Science

| AD8501 – Optimization Techniques | |
|----------------------------------|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Formulate and solve linear programming problems (LPP) |
| CO2 | Evaluate Integer Programming Problems, Transportation and Assignment Problems. |
| CO3 | Obtain solution to network problems using CPM and PERT techniques. |
| CO4 | Able to optimize the function subject to the constraints.. |
| CO5 | Identify and solve problems under Markovian queuing models |

| CW8691- Computer Networks | |
|---------------------------|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Comprehend the basic layers and its functions in computer networks |
| CO2 | Evaluate the performance of a network. |
| CO3 | Understand the basics of how data flows from one node to another. |
| CO4 | Analyze and design routing algorithms. |
| CO5 | Design protocols for various functions in the network. |
| CO6 | Understand the working of various application layer protocols |

| AD8502 – Data Exploration and Visualization | |
|---|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understand the basics of Data Exploration |
| CO2 | Use Univariate and Multivariate Analysis for Data Exploration |
| CO3 | Explain various Data Visualization methods |
| CO4 | Apply the concept of Data Visualization on various datasets |
| CO5 | Apply the data visualization techniques using R language |

AD8551 – Business Analytics

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|-----|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the real world business problems and model with analytical solutions. |
| CO2 | Identify the business processes for extracting Business Intelligence |
| CO3 | Apply predictive analytics for business fore-casting |
| CO4 | Apply analytics for supply chain and logistics management |
| CO5 | Use analytics for marketing and sales. |

AD8552 – Machine Learning

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understand the basics of ML |
| CO2 | Explain various Machine Learning methods |
| CO3 | Demonstrate various ML techniques using standard package |
| CO4 | Explore knowledge on Machine learning and Data Analytics |
| CO5 | Apply ML to various real time examples |

OCE551 – Air Pollution and Control Engineering

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understanding the nature behaviour and characteristics of air pollutants. |
| CO2 | Describing the stacks behaviour and comprehend various environmental transformation processes of pollutants under extreme weather condition. |
| CO3 | Ability to interpret meteorological data |
| CO4 | Illustrate control equipment's of particulate contaminants in air pollution. |
| CO5 | Illustrate control equipment's of gaseous contaminants in air pollution |
| CO6 | Ability to comprehend quality, control and preventive measures of noise pollution and Indoor air quality management. |

Laboratory

AD8511-Machine Learning Laboratory

COs Course Outcome : The students, after the completion of the course, are expected to

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CO1 Understand the implementation procedures for the machine learning algorithms.

CO2 Design Java/Python programs for various Learning algorithms.

CO3 Apply appropriate Machine Learning algorithms to data sets

CO4 Identify and apply Machine Learning algorithms to solve real world problems.

AD8512- Mini Project on Data Sciences Pipeline

COs Course Outcome : The students, after the completion of the course, are expected to

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CO1 Install analytical tools and configure distributed file system.

CO2 Have skills in developing and executing analytical procedures in various distributed frameworks and databases.

CO3 Develop, implement and deploy simple applications on very large datasets.

CO4 Implement simple to complex data modeling in NoSQL databases.

CO5 Implement real world applications by using suitable analytical framework and tools.

EVEN Semester 2022-23

4th Semester – B.Tech. Artificial Intelligence and Data Science

| 21MA402-Probability and Statistics | |
|------------------------------------|---|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understand the fundamental knowledge of modern probability theory and standard distributions. |
| CO2 | Categorize the probability models and function of random variables based on one and two dimensional random variables. |
| CO3 | Employ the concept of testing the hypothesis in real life problems. |
| CO4 | Implement the analysis of variance for real life problems. |
| CO5 | Apply the statistical quality control in engineering and management problems. |

| 21AI401-Artificial Intelligence | |
|---------------------------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the foundations of AI and various Intelligent agents |
| CO2 | Apply search strategies in problem solving and game playing |
| CO3 | Explain logical agents and first-order logic |
| CO4 | Apply problem-solving strategies with knowledge representation mechanism for solving hard problems |
| CO5 | Describe the basics of learning and expert systems. |

| 21AI402-Data Analytics | |
|------------------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the fundamentals of big data and data analytics |
| CO2 | Discuss the Hadoop framework |
| CO3 | Explain about exploratory data analysis and data manipulation tools |
| CO4 | Analyse and interpret streaming data |
| CO5 | Illustrate various applications of data analytics |

| 21AI403-Object Oriented Software Engineering | |
|--|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Summarize software engineering principles and activities involved in building large software programs. |
| CO2 | Describe the process of requirements gathering, analysis and unified modelling |
| CO3 | Apply the object oriented design process. |
| CO4 | Analyse the various traditional and object oriented testing methods |

CO5 Apply estimation techniques, schedule project activities and compute pricing.

21AI404-Operating System Fundamentals

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Implement the operating system concepts and process

CO2 Analyse various CPU scheduling algorithms and thread mechanism

CO3 Implement process synchronization and deadlock problems

CO4 Design various page replacement techniques to given situation

CO5 Implement various disk scheduling techniques

21CS402-Design and Analysis of Algorithms

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Explain the different algorithm design paradigms.

CO2 Design algorithms for real world problems using algorithmic design techniques.

CO3 Analyse the efficiency of simple recursive and non-recursive algorithms.

CO4 Analyse the algorithm's worst, best and average case behaviour in terms of time and space.

CO5 Apply the limits of algorithms and how to cope with them.

CO6 Develop applications by selecting suitable design technique in an efficient way.

Laboratory

21AI411-Artificial Intelligence Laboratory

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Implement search strategies

CO2 Implement and execute gaming algorithms

CO3 Design programs for Constraint satisfaction problems

CO4 Experiment the simple projects using AI Concepts

21AI412-Data Analytics Laboratory

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Setup multi-node Hadoop Clusters |
| CO2 | Apply Map Reduce algorithms for problems |
| CO3 | Perform data analysis with machine learning models. |
| CO4 | Perform graphical data analysis. |
| CO5 | Build large datasets using Hbase, Mongo DB. |

21CS414-Aptitude and Coding Skills – II

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|-----|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Develop advanced vocabulary for effective communication skills. |
| CO2 | Build an enhanced level of logical reasoning and quantitative skills. |
| CO3 | Develop error correction and debugging skills in programming. |
| CO4 | Apply data structures and algorithms in problem solving. |
| CO5 | Develop advanced vocabulary for effective reading skills |
| CO6 | Apply advanced algorithm design techniques to develop programs. |

6th Semester – B.Tech. Artificial Intelligence and Data Science

AD8601- Artificial Intelligence II

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|------------|--|
| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Explain the probabilistic reasoning using Bayesian inference |
| CO2 | Apply appropriate Probabilistic reasoning techniques for solving uncertainty problems |
| CO3 | Explain use of game theory for decision making. |
| CO4 | Explain and apply probabilistic models for various use cases |
| CO5 | Apply AI techniques for robotics |

AD8602 - Data and Information Security

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Understand the fundamentals of security and the significance of number theory in computer security |
| CO2 | Learn the public key cryptographic standards and authentication scheme |
| CO3 | Able to apply the security frameworks for real time applications |
| CO4 | Understand the security threats and attacks in IoT, Cloud. |
| CO5 | Able to develop appropriate security algorithms understanding the possible threats |

IT8501- Web Technology

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| COs | Course Outcome : The students, after the completion of the course, are expected to |
| CO1 | Design simple web pages using markup languages like HTML and XHTML. |
| CO2 | Create dynamic web pages using DHTML and java script that is easy to navigate and use. |
| CO3 | Program server side web pages that have to process request from client side web pages. |
| CO4 | Represent web data using XML and develop web pages using JSP. |
| CO5 | Understand various web services and how these web services interact |

CW8591 – Software Architecture

COs Course Outcome : The students, after the completion of the course, are expected to

CO1 Develop Software applications starting from software architecture and design.

CO2 Learn and evaluate existing software architectures.

CO3 Realize importance of architectural documentation and document them.

CO4 Employ various software architecture design components.

CO5 Design methods for improving software quality from the perspective of software architecture

AD8007 – Software Testing and Quality Assurance

COs Course Outcome : The students, after the completion of the course, are expected to

CO1 Understand the software process phases in the cycle of software development.

CO2 Gain knowledge of software economics, project organization, project control and process instrumentation

CO3 Analyze the major and minor milestones, artifacts and metrics from management and technical perspective.

CO4 Design and develop software product using conventional and modern

CO5 Analyze the real time software development processes.

Laboratory

IT8511- Web Technology Laboratory

COs Course Outcome : The students, after the completion of the course, are expected to

CO1 Design simple web pages using markup languages like HTML and XHTML.

CO2 Create dynamic web pages using DHTML and java script that is easy to navigate and use.

CO3 Program server side web pages that have to process request from client side web pages.

CO4 Represent web data using XML and develop web pages using JSP.

CO5 Understand various web services and how these web services interact

AD8611- Artificial Intelligence - II Laboratory

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Solve basic AI based problems

CO2 Implement the concept of Bayesian Network.

CO3 Apply AI techniques to real-world problems to develop intelligent systems

CO4 Implement HMM for real-world application

CO5 Use Reinforcement Learning to implement various intelligent systems

HS8581 - Professional Communication

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 Make effective presentations

CO2 Participate confidently in Group Discussions.

CO3 Attend job interviews and be successful in them.

CO4 Develop adequate Soft Skills required for the workplace

AD8612- Socially relevant Project

COs **Course Outcome : The students, after the completion of the course, are expected to**

CO1 The students are expected to use different platforms and tools like SAS, Python, R, Scala.

CO2 Big Data: Hadoop Ecosystem (Hive, Pig, Sqoop, Flume), Big Data Lakes, NoSQL, Apache Spark, Spark MLlib, HPC, Storm.

CO3 Business Intelligence : SQL, Microsoft Power BI, SAP BI, Tableau, Oracle Fusion,

CO4 Machine Learning and Deep Learning : TensorFlow, Keras, Artificial Neural Networks, Deep Neural Networks, Convolution Neural Networks, Auto encoders.