



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA

Deemed to be University

(Declared under Distinct Category by Ministry of Education, Government of India)

NAAC ACCREDITED WITH A++ GRADE

PROFESSIONAL SKILLS & COMPETENCIES (Activity Based Learning)

COURSE OBJECTIVES

- To equip students with essential professional competencies.
- To develop analytical and technical skills.

Module 1: Communication Skills

Verbal Communication: Public speaking, Group discussions, and Interview handling. Non-verbal Communication: Body language, Gestures, Listening skills. Written Communication: Résumé writing, Email etiquette, Cover letters, Report Writing. Presentation Skills: Visual aids, Audience engagement, Delivery techniques.

Activities: Mock interviews and GDs, Email & résumé writing workshops, Peer review and instructor feedback.

Module 2: General Aptitude

Quantitative Aptitude: Number systems, Ratios, Percentages, Averages, Time & Work, Probability. Logical Reasoning: Series, Puzzles, Syllogisms, Direction sense, Blood relations. Data Interpretation: Tables, Pie charts, Graphs.

Activities: Weekly quizzes, Group problem-solving sessions, Timed mock aptitude tests.

Module 3: Basic Coding Skills

Basic Programming Concepts, Syntax and semantics, Input/output handling, Variables, data types, Loops. Functions and recursion. Arrays, strings. Sorting and searching, Pointers (C/C++) / References (Java/Python). Exception handling (Java, Python).

Activities: Technical round based Weekly coding exercises, Mini hands-on projects, Error debugging practice, Mock technical tests.

Module 4: Competitive Coding Skills

Introduction to Data Structures: Linked Lists (Singly, Doubly), Problem solving using linked lists. Stacks, Queues, Trees (Binary, BST, basic traversals), Heaps (Min/Max heap concepts), Graphs (Adjacency list/matrix, BFS, DFS), Sets (HashSet, TreeSet). OOPS concepts: Encapsulation, Abstraction, Inheritance and Polymorphism. Introduction to Databases, ER-model, basics of SQL. Version Control: Git, GitHub.

Activities: Weekly coding contests, Problem solving on competitive coding platforms like Leetcode, Codeforces, Hackerrank etc., Peer-to-peer code review, Mock technical interviews.

Module 5: Discipline Specific Tools*

CSE/ CSD / IT: Git & GitHub, Docker, Postman, MySQL, VS Code, Linux Shell.

Electronics / Electrical: MATLAB, Simulink, Multisim, Proteus, LTspice, Arduino IDE.

Mechanical Engineering: AutoCAD, SolidWorks, ANSYS, MATLAB, Fusion 360.

Civil Engineering: AutoCAD Civil 3D, STAAD Pro, Revit, Primavera, GIS tools.

AI&DS/ AI&ML / IT(AIR): Jupyter Notebook, Pandas, Scikit-learn, TensorFlow, Tableau.

IoT: Arduino IDE, Raspberry Pi, ESP-32, LoRaWAN, ESP-IDF, PlatformIO, LTspice.

Activities: Tool-based lab exercises, Branch-specific mini projects, Short presentations on use-cases of tools in industry.

*Respective departments may include discipline specific tools which are essential for students.



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COURSE OUTCOMES

After completion of the course students will be able to:

- CO1 Demonstrate effective communication strategies in professional scenarios including interviews and group discussions.
- CO2 Solve real-world quantitative and logical reasoning problems with time-bound accuracy.
- CO3 Implement basic algorithms using standard programming languages.
- CO4 Design efficient algorithmic solutions to solve coding problems.
- CO5 Apply discipline-specific tools to simulate, model, or develop solutions relevant to core engineering problems.

CO-PO Mapping Matrix												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								1	3	3		2
CO2	2	3				2		1				2
CO3	3	2			2							2
CO4	3	3	3	2	2							2
CO5	2	2	2	2	3	3	1				1	2



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B. Tech. (Seventh Semester)

Universal Human Values & Professional Ethics (1000008)

Course Objectives: The objective of the course is four fold:

1. Sensitization of student towards self, family (relationship), society and nature.
2. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education:

- Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

2: Understanding Harmony in the Human Being:

- Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
- Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
- Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
- Understanding the harmony of ‘I’ with the Body

3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship:

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society

4: Understanding Harmony in the Nature and Existence - existence as Coexistence:

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self- regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all pervasive space
- Holistic perception of harmony at all levels of existence.

5: Holistic Understanding of Harmony on Professional Ethics:

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics:
 - a. Ability to utilize the professional competence for augmenting universal human order
 - b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,
 - c. Ability to identify and develop appropriate technologies and management patterns for above production systems.



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- Strategy for transition from the present state to Universal Human Order:
 - a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
 - b. At the level of society: as mutually enriching institutions and organizations

6: Gender Sensitisation:

- Introduction to Sex, Gender & Culture
- Introduction to Women Studies and Socialisation, including man-woman relationship, work distribution
- A brief review of Feminism, Patriarchy, Feminist Studies, Feminist Ideologies.
- Women and Law Constitutional Provisions and Fundamental rights related to Women.

Course Outcomes:

At the end of the course student will be able

CO-1: to become more aware of their surroundings, society, social problems and their sustainable solutions.

CO-2: to become sensitive to their commitment towards what they believe in (humane values. humane relationships and humane society).

CO-3: to apply what they have learnt to their own self in different day-to-day settings in real life.

CO-4: to sustain human relationships and human nature in mind.

CO-5: to have better critical ability.

CO-6: to negotiate living in harmony with self and others.

Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. On Education - J Krishnamurthy
6. Siddhartha - Hermann Hesse
7. Old Path White Clouds - Thich Nhat Hanh
8. On Education - The Mother
9. Diaries of Anne Frank - Anne Frank
10. Life and Philosophy of Swami Vivekananda
11. Swami Vivekananda on Himself
12. Small is Beautiful - E. F Schumacher.
13. Slow is Beautiful - Cecile Andrews
14. Economy of Permanence - J C Kumarappa
15. Bharat Mein Angreji Raj - Pandit Sunderlal
16. Mahatma and the Rose
17. The Poet and the Charkha
18. Rediscovering India - by Dharampal
19. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
20. Swaraj by Arvind Kejriwal
21. India Wins Freedom - Maulana Abdul Kalam Azad
22. Ramakrishna ki jeevani - Romain Rolland (English)
23. Vivekananda - Romain Rolland (English)
24. Gandhi - Romain Rolland (English)
25. Autobiography of a Yogi – by Paramhansa Yogananda
26. Gandhi and Question of Science – Sahatsrabudhe



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Department of Engineering Mathematics and Computing

B. Tech. (VII- Sem.)

Analytics Using R Programming (DLC-2250704)

COURSE OBJECTIVES

- To understand the critical programming language concepts.
- To perform data analysis using R commands.
- To make use of R loop functions and debugging tools.

Unit-I

Introduction to R: Basic Syntax in R Programming, Packages, Comments in R, Operators, Keywords, Datatypes, Variables, Input/Output, Control Flow.

Unit-II

Functions: Types of function in R Language, Recursive Functions, Conversion Functions.
Data Structures: String, Vector, Lists, Array, Matrices, Factors, Data Frames.

Unit-III

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting.

Unit-IV

Object-Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Data Munging, Importing Data, Exporting Data.

Unit-V

Analysis & Modeling: Time Series Analysis, Classification, Regression, and Machine Learning: Supervised and Unsupervised Learning.

Course Outcomes

After completing this course, the students will be able to:

CO's	Description of CO's
CO1	Define basic programming constructs used in R
CO2	Explain the various commands used in R
CO3	Apply various concept of programming for controlling the flow of data using R.
CO4	Analyze the concept of concept of object oriented programming in R.
CO5	Choose and predict appropriate packages of R programming for dealing various tasks

Recommended Books:

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education.
- "R programming for Data Science", Roger D. Peng, Learn publishing.



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Departmental LAB 2250704 (7 Sem.)

Analytics Using R Programming

LIST OF PROGRAMS:

1. Download and install R-Programming environment and install basic packages using install. Packages () command in R.
2. Learn all the basics of R-Programming (Data types, Variables, Operators etc.)
3. Implement R-Loops with different examples.
4. Learn the basics of functions in R and implement with examples.
5. Implement data frames in R. Write a program to join columns and rows in a data frame using c bind () and r bind () in R.
6. Implement different String Manipulation functions in R.
7. Implement different data structures in R(Vectors,Lists,Data Frames)
8. Write a program to read acsv file and analyze the data in the file in R
9. Create pie charts and bar charts using R.
10. Create a data set and do statistical analysis on the data using R.
11. Write R program to find Correlation and Covariance
12. Write R program for Regression Modeling
13. Write R program to build classification model using KNN algorithm
14. Write R program to build clustering model using K-mean algorithm