GURU KASHI UNIVERSITY

B. Voc.in – Artificial Intelligence & Machine Learning

Session: 2024-25

Department of Computer Science & Engineering

Programme Structure

Semester: I						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credits**
BMA101	Programming for Problem Solving	Skill Based	4	0	0	4
BMA102	Programming for Problem Solving Lab	Compulsory Foundation	0	0	4	2
BMA103	Mathematics-I	Compulsory Foundation	4	0	0	4
BMA104	Communication Skills	Skill Based	4	0	0	4
BMA105	Communication Skills Lab	Compulsory Foundation	0	0	2	1
BMA106	Basics of Artificial Intelligence and Machine Learning	Skill Based	4	0	0	4
BMA107	Fundamental of Computer and Information Technology Lab	Skill Based	0	0	2	1
Total			**16**		**08**	**20**

Course Title: PROGRAMMING FOR PROBLEM SOLVING	L	T	P	Credits
Course Code: BMA101	4	0	0	4

Semester: I

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Design the algorithms to write programs.
2. Illustrate arrays, pointers and structures to formulate algorithms and programs
3. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration
4. Implement conditional branching, iteration and recursion.

Course Content

UNIT I   **18 Hours**

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory Locations,

Syntax and Logical Errors in compilation, obj ect

and executable code-

UNIT II   **18 Hours**

Arithmetic expressions and precedence: Conditional Branching and Loops Writing and evaluation of conditionals and consequent branching

Iteration and loops

Arrays: Arrays (1-D, 2-D), Character arrays and Strings

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of Equations, notion of order of complexity through example programs (no formal definition requirement.

UNIT III   **10 Hours**

Function: Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference.

Recursion: Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort. **UNIT IV   14 Hours**

Structure: Structures, Defining structures and Array of Structures

Pointers: Idea of pointers, defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

File handling (only if time is available, otherwise should be done as part of the lab.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning **Suggested Readings**

- *Byron Gottfried, Schaum's (1995), Outline of Programming with C, McGraw-Hill.*
- *E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill.*

Course Title:	**PROGRAMMING FOR PROBLEM SOLVING LAB**	L	T	P	Credits
Course Code: BMA102		0	0	4	2

Total Hours: 30

Learning Outcomes: After completion of this course, the learner will be able to:
1. Create read and write to and from simple text files.
2. Identify and correct logical errors encountered at run time
3. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
4. Represent data in arrays, strings and structures and manipulate them through a program

Course Content
1. Problem solving using computers
2. Familiarization with programming Environment
3. Variable types and type conversions
4. Simple computational problems using arithmetic expressions
5. Branching and logical expressions
6. Problems involving if-then-else structures
7. Loops, while and for loops
8. Iterative problems e.g., sum of series
9. 1D Arrays: searching, sorting
10. 1DArray manipulation
11. 2D arrays and Strings, memory structure
12. Matrix problems, String operations
13. Functions, call by value
14. Simple functions
15. Numerical methods (Root finding, numerical differentiation, numerical integration)
16. Numerical methods problems
17. Recursion, structure of recursive calls
18. Recursive functions
19. Pointers, structures and dynamic memory allocation
20. Pointers and structures
21. File handling
22. File operations

Suggested Readings
- *Byron Gottfried, Schaum's (1995), Outline of Programming with C, McGraw-Hill*
- *E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill.*

Course Title: MATHEMATICS-I Course
code: BMA103

Total Hours: 60

Learning Outcomes: After completion of this course, the learner will be able to:
1. Apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. Classify of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. Illustrate the Tool of power series and Fourier series for learning advanced Engineering Mathematics.
4. Use of functions of several variables that is essential in most branches of engineering and tools of matrices and linear algebra in a comprehensive manner.

Course Content

UNIT I **20 Hours**

Calculus: Evaluates and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Rolle 's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and Hospital's rule; Maxima and minima.

Advanced Calculus: Differentiation: Limit continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Integration: Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes by (double integration) Center of mass and Gravity (constant and variable densities). Theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT II **10 Hours**

Trigonometry: Hyperbolic and circular functions, logarithms of complex number resolving real and imaginary parts of a complex quantity, De Moivre's Theorem.

Theory of equations: Relation between roots and coefficients, reciprocal Equations, transformation of equations and diminishing the roots.

UNIT III   **15 Hours**

Sequences and series: Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT IV   **15 Hours**

Algebra: Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank- nullity theorem, composition of linear maps, Matrix associated with a linear map.

Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, Eigen bases, Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning **Suggested Readings**

- *Thomas, G. B. (1992). Calculus and analytic geometry. Massachusetts Institute of Technology, Massachusetts, USA, Addison-Wesley Publishing Company, ISBN: 0-201- 60700-X.*
- *UNIT, I. 16MA101 ENGINEERING MATHEMATICS-I LTPC. SNS COLLEGE OF TECHNOLOGY, 7, 19.*
- *Bali, N. P., & Goyal, M. (2010). A Textbook of Engineering Mathematics (PTU, Jalandhar) Sem-III/IV. Laxmi publications.*
- *PO, P. Edition, New Delhi, 2012. 6. Ramana BV, "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010. DEPARTMENT OF INSTRUMENTATION ENGINEERING ANNA UNIVERSITY, CHENNAI, 24.*

Course Title:	Communication Skills	L	T	P	Credits
Course Code: BMA104		4	0	0	4

Total Hours: 45

Learning Outcomes: After completion of this course, the learner will be able to:
1. Develop vocabulary and improve the accuracy in Grammar.
2. Apply the concepts of accurate English while writing and become equally ease at using good vocabulary and language skills.
3. Develop and Expand writing skills through Controlled and guided activities.
4. Compose articles and compositions in English.

Course Content

UNIT I   **20 Hours**

Vocabulary Building: The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.

UNIT II   **15 Hours**

Basic Writing Skills: Sentence Structures, use of phrases and clauses in sentences, Importance of proper punctuation, creating coherence, organizing principles of paragraphs in documents, Techniques for writing precisely.

UNIT III   **10 Hours**

Identifying Common Errors in Writing: Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Cliché

UNIT IV   **15 Hours**

Nature and Style of sensible Writing: Describing, Defining, Classifying, providing examples or evidence, writing introduction and conclusion

Writing Practices: Comprehension, Précis Writing, Essay Writing.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning.

Suggested Readings

- *Swan, Michael. (1995). Practical English. OUP.*
- *Wood, F.T. (2007). Remedial English Grammar. Macmillan.*
- *Zinsser, W. (2001). On Writing Well. Harper Resource Book.*
- *Lyons, L. H. &Heasly, B. (2006). Study Writing. Cambridge University Press.*
- *Kumar, S &Lata, P. (2011). Communication Skills. Oxford University Press.*
- *CIEFL, Hyderabad. Exercises in Spoken English. Parts. I-III. Oxford University Press.*

Course Title: **COMMUNICATION SKILLS LAB**

Course Code: BMA105

L	T	P	Credits
0	0	2	1

Total Hours: 15

Learning Outcomes: After completion of this course, the learner will be able to:

1. Illustrate the importance of pronunciation and apply the same day to day conversation.
2. Apply verbal and   non-verbal communication techniques in the Professional Environment.
3. Develop coherence, cohesion and competence in Oral discourse.
4. Evaluate the interview process confidently.

Course Content

Oral Communication

(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

	L	T	P	Credits
Course Title: Basics of Artificial Intelligence and Machine Learning **Course Code: BMA106**	4	0	0	4

Total Hours-60

Learning Outcomes: After completion of this course, the learner will be able to:

1. Design expert system by using AI tools.
2. Compare and develop expert system with the help of Neural Networks
3. Understand the concept of expert system using Machine Learning.
4. Create an expert system using Fuzzy Logic.

Course Content

UNIT I **20 Hours**

Introduction: What is AI, Importance of AI, Early work in AI, Applications of AI, Knowledge and its definition. Knowledge Representation: Prepositional logic, FOPL, Properties of Well-formed formulas, Conversion to Clausal form, Inference rules, Resolution principle.

Structured Knowledge: Introduction, Associate frame structures, Conceptual dependencies and scripts.

UNIT II **15 Hours**

Knowledge Organization and Manipulation: Concepts, Uninformed or Blind search, informed search, Searching- And-OR graphs, Pattern Recognition, Recognition Classification process, Classification patterns, Recognizing and understanding speech. **Generative AI**: How does generative AI work? Generative AI models, what are Dall-E, ChatGPT and Bard, use cases, benefits and its limitations, Ethics and bias, Generative AI vs. AI, Generative AI history.

UNIT III **10 Hours**

Planning: planning as search, partial order planning, construction and use of planning graphs. Decision-Making: basics of utility theory, decision theory, sequential decision problems, elementary game theory and sample applications.

UNIT IV **15 Hours**

Expert System: Definition, Rule based architecture, dealing with uncertainty, Knowledge acquisition and validation, knowledge system building tools.

Knowledge Acquisition: Types of learning, General Learning model, Performance measures. Learning nearest neighbor, naive Bayes, and decision tree classifiers.

Transaction Modes

Lecture, Seminar, e-Team Teaching, e-Tutoring, Dialogue, Peer Group Discussion, Mobile Teaching, Self-Learning, Collaborative Learning and Cooperative Learning **Suggested Readings**

- *Dan W. Patterson. (1990). Introduction to Artificial Intelligence and Expert Systems.PHI Publication.*
- *Peter Jackson. (1998). Introduction to Expert System. AddisonWesley.*

Course Title: Fundamental of Computer and Information Technology Lab	L	T	P	Credits
Course Code: BMA107	0	0	2	1

Total Hours: 15

Course learning outcomes: On successful completion of this course, students will be able to:

1. Understanding the concept of input and output devices of Computers
2. Study to use the Internet safely, legally, and responsibly.
3. Understand an operating system and its working, and solve common problems related to operating systems
4. Learn basic word processing, Spreadsheet and Presentation Graphics Software skills

Course Content

1. Various Components of a Computer.
2. Introduction to Microsoft Word & Presentation
3. Make a simple presentation on your college,
4. use 3D effects , on prescribed presentation
5. Applications of Ms-Office Ms-Word
6. Ms-Excel
7. Ms-PowerPoint
8. Create web pages for your college using different tags.
9. web Browser and E- Mail

10.   Conversion of a word documents into PDF/ Image conversion using image file format.