Chaudhary Ranbir Singh University

(Established by the Haryana State Legislature Act 28 of 2014)
(Recognised u/s 2(f) and 12(B) of UGC Act, 1956)

Syllabus
for

Under Graduate Programme

Bachelor of Technology (Artificial Intelligence and Machine Learning)
(B.Tech. (AI&ML))

with effect from the session 2024-25 (in phased manner)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
FACULTY OF PHYSICAL SCIENCES

CHAUDHARY RANBIR SINGH UNIVERSITY
JIND – HARYANA – INDIA - 126102

With effect from the Session: 2024-25

Part A - Introduction

Name of the Programme	B.Tech. (Computer Science – AI & ML)
Semester	1st
Name of the Course	Communication Skills
Course Code	24-BTHS-101
Course Type	Humanities and Social Science
Course Objectives	The main aim of the course is to build competence in English grammar and vocabulary and to enhance effective communication by developing Reading, Writing, Listening and Speaking skills of students.
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO-1. Understand various technical writing skills. CLO-2 Apply the technical writing and communication skills in their academic and professional life. CLO-3 Gain self-confidence with improved command over English. CLO-4 Understand the technical aspects of communication for better performance in extracurricular activities, recruitment process and prospective jobs.
Internal Assessment Marks	20
End Term Exam Marks	80
Max. Marks	100
Min Pass Marks	Internal 8 External 32
Examination Time	3 hours

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics
I	Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing, Technical Communication, Tools of Effective Communication.
II	Basics of Grammar – Placing of Subject and Verb, Parts of Speech, Uses of Tenses, Active Passive, Narration. Word Formation & Synonyms, Antonyms, Words Often Confused, One-Word Substitutes, Idioms and Phrasal Verbs, Abbreviations of Scientific and Technical Words.
III	Introduction to Phonetic Sounds & Articulation, Word Accent, Rhythm and Intonation, Interpersonal Communication, Oral Presentation, Body Language and Voice Modulation (Para linguistics and Non- Verbal), Negotiation and Persuasion, Group Discussion, Interview Techniques (Telephonic and Video Conferencing).
IV	Job Application, CV Writing, Business Letters, Memos, Minutes, Notices, Report Writing & Structure, E-mail Etiquette, Blog Writing.

Part C-Learning Resources

Reference Books:

1) Introducing Oneself, Exercise on Parts of Speech & Exercise on Tense.
2) Exercise on Agreement, Narration, Active Passive Voice & Dialogue Conversation.
3) Exercise on Writing Skills and Listening Comprehension (Audio CD).
4) Practice of Phonemes, Word Accent, Intonation, JAM Session.
5) Individual Presentation, Extempore and Picture Interpretation.
6) Vocabulary Building Exercises (One Word Substitute, Synonyms, Antonyms, Words Often Confused etc.) & Group Discussion.

Part A - Introduction	
Name of the Programme	B.Tech. (Computer Science – AI & ML)
Semester	1st
Name of the Course	Mathematics - I
Course Code	24-BTBS-101
Course Type	Basic Science
Course Objectives	To make the students well versed with the concepts of linear algebra. The students should also be able to solve calculus and vector calculus-based problems.
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO-1. Understand basic algebra CLO-2. Understand and apply calculus CLO-3. Understand and apply vector calculus CLO-4. Understand and apply differential equations CLO-5. Understand and apply multivariate calculus
Internal Assessment Marks	20
End Term Exam Marks	80
Max. Marks	100
Min Pass Marks	Internal 8 External 32
Examination Time	3 hours

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics
I	Linear Algebra Vector spaces, Subspaces, basis and dimension, linear transformations, representation of transformations by Matrices, linear functionals, transpose of linear transformations, canonical forms. Linear functionals and adjoints, Bilinear forms, symmetric bilinear forms, skew symmetric bilinear forms
II	Calculus Continuity and differentiability of a function of single variable, statement of Rolle's Theorem, Lagrange's mean value theorem and applications. Double and Triple Integrals: Calculations, Areas, Volumes, change of variables
III	Differential Equations Ordinary Differential Equations: First order linear equations, Bernoulli's equations, Exact equations and integrating factor, Second order and Higher order linear differential equations with constant coefficients
IV	Multivariate Calculus Integral Calculus: Definite Integrals as a limit of sums, Applications of integration to area, volume, surface area, Improper integrals. Functions of several variables: Continuity and differentiability, mixed partial derivatives, local maxima and minima for function of two variables, Lagrange multipliers.

Part C-Learning Resources

Reference Books:

1) G. B. Thomas, R. L. Finney. Calculus and Analytic Geometry, Ninth Edition, Pearson Education, 2010
2) Reena Garg, Advanced Engineering Mathematics, Khanna Book Publishing Co., Delhi.
3) B. V. Ramana. Higher Engineering Mathematics, Tata McGraw Hill, 2017
4) E. Kreyszig. Advanced Engineering Mathematics, Wiley, 2015
5) Calculus and Analytic Geometry, G. B. Thomas and R. L. Finney, Pearson Education, 2010

Part A - Introduction	
Name of the Programme	B.Tech. (Computer Science – AI & ML)
Semester	1st
Name of the Course	Physics
Course Code	24-BTBS-102
Course Type	Basic Science
Course Objectives	This course will help the students to familiarize with Ultrasonics, SHM, Oscillations, Wave motion, diffraction, polarization, laser, fiber optics and holography concepts.
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO-1. Understand latest developments in certain areas of Physics which have important applications for societal needs. CLO - 2Understand lasers and fibre optics which have important applications for societal needs. CLO - 3. Understand latest developments in certain areas of Physics which have important applications for societal needs. CLO - 4. Develop capability to tackle problems in general and in the various areas covered in the course.
Internal Assessment Marks	20
End Term Exam Marks	80
Max. Marks	100
Min Pass Marks	Internal 8 External 32
Examination Time	3 hours

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics
I	Ultrasonics & SHM Production, detection and uses of ultrasonics, reverberation, Sabine's formula (no derivation), Review of basic kinematics (displacement, velocity, acceleration, time period and phase of vibration) and dynamics (restoring force and energetics) of simple harmonic motion, differential equation of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits
II	Wave Motion and interference Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances, Division of wave front and amplitude; Fresnel's biprism, Newton's rings, Michelson interferometer and its applications for determination of λ and $d\lambda$.
III	Diffraction & Polarization Fresnel and Fraunhofer diffraction, qualitative changes in diffraction pattern on moving from single slit to double slit, plane transmission grating, dispersive power & resolving power of a grating, Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction.

Lasers, Fibre Optics and Holography

Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein's coefficients, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems, Holography: Basic principle, theory and requirements.

Laboratory/ Practicals:

1. To find the wavelength of sodium light using Fresnel's biprism.
2. To determine the wavelength of He-Ne laser using transmission grating.
3. To determine the slit width using the diffraction pattern.
4. To determine the wave length of sodium light by Newton's rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Bi-quartz Polarimeter.

Part C-Learning Resources

Reference Books:

1) Engineering Physics by A.B. Bhattacharya, Khanna Publishing House, 2020.
2) Physics for Engineers by N.K. Verma, Prentice Hall India, 2017.
3) Physics of Vibrations and Waves by H.J.Pain, 5th Edition, Wiley, 2006.
4) Optics by Ajoy Ghatak, McGraw Hill Education India, 2017.

Part A - Introduction	
ne of the Programme	B.Tech. (Computer Science – AI & ML)
ester	1st
Nam of the Course	Mathematical Concepts for AI
Course Code	24-BTES-101
Course Type	Engineering Science
Course Objectives	This course should help the students understand the basic mathematical background of AI. Also, the students should be able to apply statistics and probability to analyse various datasets.
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO-1. To understand the mathematical background of AI. CLO-2. Use statistical methods to analyze and collect data. CLO-3. Use probability and statistics to analyze data CLO-4. Use and apply hypothesis testing on different datasets
Internal Assessment Marks	20
End Term Exam Marks	80
Max. Marks	100
Min Pass Marks	Internal 8 External 32
Examination Time	3 hours

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics
I	Equations, Functions and Graphs Introduction to linear equations, Intercepts and slopes, System of equations, Exponentials, radicals and logarithms, Polynomials, Polynomial operations, Factorizations, Introduction to quadratic equations, Functions
II	Vectors and Matrices Introduction to vectors, Vector addition, vector multiplication, Introduction to matrices, matric multiplication, properties of matrices, types of matrices, Matrix division, solving system of equations with matrices, Matrix transformations, Eigen values and eigen vectors, rank of matrix
III	Probability Basic rules and axioms events, sample space, dependent and independent events, conditional probability, Random variables- continuous and discrete, expectation, variance, distributions- joint and conditional, Bayes' Theorem, Popular distributions- binomial, Bernoulli, poisson, exponential, Gaussian
IV	Statistics Fundamentals of Data: Collection, Summarization, and Visualization; Sampling and Sampling Distributions, Central Limit Theorem; Methods of Estimation, Unbiased estimators; Confidence Interval Estimation: Z-interval, t-interval; Hypothesis Testing, Types of Errors, Rejection Region Approach and p-value Approach.

Part C-Learning Resources

Reference Books:

1) Mathematics for Machine Learning, Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Cambridge University Press., 2020
2) Advanced Engineering Mathematics, Reena Garg, Khanna Book Publishing Co., Delhi.
3) Machine Learning, Rajiv Chopra, Khanna Book Publishing Co., Delhi.
4) Introduction to Applied Linear Algebra: Vectors, Matrices, and Least Squares, Stephen Boyd, Lieven Vandenberghe, Cambridge University Press., 2018
5) Probability and statistics for Engineers and Scientists, Walpole, Myers, Myers and Ye, Pearson Education, 2012
6) Advanced Engineering Mathematics, Wylie and Barrett, McGraw Hill, 1995

Chaudhary Ranbir Singh University, Jind

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(Recognised u/s 2(f) and 12(B) of UGC Act, 1956)

Scheme of Examination
for
Under Graduate Programme

Bachelor of Technology
(Computer Science - Artificial Intelligence and Machine Learning)
(B.Tech. (CS - AI&ML))

with effect from the session 2024-25 (in phased manner)

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Programme Learning Outcomes (PLOs): PLOs include outcomes specific to disciplinary areas of learning associated with the chosen field (s) of learning as well as generic learning outcomes. These also include transferable skills and competencies that post-graduates of all programmes of study should acquire and be able to demonstrate for the award of the Degree. The programme learning outcomes would also focus on knowledge and skills that prepare students for further study, employment, research, and responsible citizenship.

The PLOs of the **BTech (CS - AI&ML)** programme are stated as per the following domains:

PLOs	After the completion of BTech degree, a student will be able to:
PLO-1: Knowledge and Understanding	Demonstrate the deep understanding and advanced knowledge in the core areas of Computer Science subject and understanding of recent developments and issues, including concepts, theories, principles, methods, and techniques in different areas of Computer Science.
PLO-2: General Skills	Acquire the general skills required for performing and accomplishing the tasks as expected to be done by a skilled professional in the fields of Computer Applications.
PLO-3: Technical/ Professional Skills	Demonstrate the learning of advanced cognitive computing, programming, formulating models, using various softwares, and other teaching and professional skills required for completing the specialized tasks related to the profession and for conducting and analyzing the relevant research tasks in different domains of Computer Applications.
PLO-4: Communication Skills	Effectively communicate the attained skills in different areas of Computer Science in a precise, well-structured, and unambiguous mathematical language through effective oral and/or written expressions to the society at large.
PLO-5: Application of Knowledge and Skills	Apply the acquired knowledge and skills to the problems in the subject area, and identify and analyze the issues where the attained knowledge and skills can be applied by carrying out various industry-oriented projects and/or research investigations to formulate appropriate solutions to various problems ranging from basic to complex and unpredictable problems associated with the field of Computer Applications or allied fields.
PLO-6: Critical Thinking and Research Aptitude	Attain the capabilities of critical thinking, logical reasoning, investigating problems, analysis, problem-solving, and application of computer science methods/techniques, in intra/inter-disciplinary areas of **Computer Applications,** enabling to develop skills to solve problems having applications in other disciplines and/or in the real world and to formulate, synthesize, and articulate issues for analyzing, designing, and implementing of project/research proposals, testing hypotheses, and drawing inferences based on the analysis.
PLO-7: Constitutional, Humanistic, Moral Values and Ethics	Knowledge of constitutional, humanistic, moral and ethical values, and intellectual property rights to become a scholar/professional with ingrained values in expanding knowledge for the society, and to avoid unethical practices such as fabrication, falsification or misrepresentation of data or committing plagiarism.
PLO-8: Capabilities/ qualities and mindset	To exercise personal responsibility for the outputs of own work as well as of group/team and for managing complex and challenging work(s) that requires new/strategic approaches.
PLO-9: Employability and job-ready skills	Attain the knowledge and skills required for increasing employment potential, adapting to the future work and responding to the rapidly changing demands of the employers/industry/society with time, and to have strong foundation in basic and applied aspects of Computer Science so as to venture into research in different areas of computer science, jobs in scientific and various industrial sectors and/or teaching career in Computer Applications.

Chaudhary Ranbir Singh University, Jind

Scheme of Examination for Under Graduate Programme

Bachelor of Technology (Computer Science - Artificial Intelligence and Machine Learning)

Semester	Course Code	Nomenclature of course	Credits		Contact hours per week L: Lecture P: Practical T: Tutorial				Internal Assessment Marks	External Examination Marks	Total Marks	Min Pass Marks
			Course	Sem. Total	L	T	P	Contact Hours				
1	24-BTHS-101	Communication Skills	4	16	2	1	2	5	20	80	100	40
	24-BTBS-101	Mathematics - I	4		3	1	0	4	20	80	100	40
	24-BTBS-102	Physics	4		3	0	2	5	20	80	100	40
	24-BTES-101	Mathematical Concepts for AI	4		3	1	0	4	20	80	100	40
					11	3	4	18			400	160

In addition to above said courses, student need to undergo mandatory induction programme as per AICTE norms.

11/7/24 11/7/24 11/7/24 11/7/24