

**CENTRAL UNIVERSITY OF KARNATAKA
KALABURAGI
SCHOOL OF COMPUTER SCIENCES**



CENTRAL UNIVERSITY OF KARNATAKA

COURSE STRUCTURE AND SYLLABUS

Bachelor of Technology (B. Tech)

COMPUTER SCIENCE & ENGINEERING (AI & ML)

(Effective from the academic year 2024 –25)

Department of Computer Science,
School of Computer Sciences,
Central University of Karnataka
Kalaburagi-585367

**CENTRAL UNIVERSITY OF
KARNATAKA**

(Established by an Act of the Parliament in 2009)
Kadaganchi, Kalaburagi – 585367, INDIA



**Department of Computer Science
School of Computer Science**
Kadaganchi, Aland Road,
Kalaburagi District– 585367

Bachelor of Technology (Computer Science)

ABOUT PROGRAM

The B.Tech. Computer Science and Engineering, with specialization of Artificial Intelligence and Machine Learning program launching in 2024 provides a comprehensive blend of theoretical knowledge and practical skills in cutting-edge technologies. Through a diverse curriculum, students gain expertise in computer science fundamentals, artificial intelligence, machine learning, deep learning, and natural language processing, alongside specialized training in AI and ML. Hands-on laboratory sessions using advanced computational software facilitate practical exploration of AI, ML, and data analytics concepts. Elective courses in AI and ML allow students to shape their education to their career aspirations. Opportunities for research projects foster innovation and creativity in AI and ML technologies. Graduates are prepared for diverse roles such as AI specialists, software engineers, and data scientists. The program also serves as a solid foundation for further studies in top institutions worldwide.

ELIGIBILITY FOR ADMISSION

Students who have passed PU/Plus Two examination with 50% marks (45% for OBC {NON CREAMY LAYER}, SC, ST, PWD and Kashmiri Migrant and nonmigrant pandits) and having studied Physics, Chemistry and Mathematics (Note: 50% average score (45% for OBC {NON CREAMY LAYER}, SC, ST, PWD and Kashmiri Migrant and nonmigrant pandits) is mandatory in Physics, Chemistry and Mathematics). The merit list shall be prepared based on the students CUET - UG 2024 score (conducted by NTA) from domain Subjects (Physics, Chemistry and Mathematics). 50% of the seats will be filled on the basis of performance in JEE– Main Exam (2024), the national level test conducted by the IITs for admission to all their UG programmes. Remaining 50% seats will be filled on the basis of merit in the Common University Entrance Test (CUET) 2024 to be conducted by NTA

DURATION OF COURSE

4 years (8 Semester)

MEDIUM OF INSTRUCTION

The medium of instruction shall be English.

PASSING AND CLASSIFICATION

The minimum marks for passing and classification for the award of the BTech in Computer Science and Engineering (AI and ML) degree shall be as per the existing norms of other UG degree courses of Central University of Karnataka, Kalaburagi.

OTHER PROVISIONS

All the other provisions relating to attendance, reappearance in examinations, repeat and saving clauses, removal of difficulties, etc., shall be as per the existing norms of other UG degree courses of Central University of Karnataka, Kalaburagi.

Vision Statement:

To groom the students technically competent and skilled intellectual professionals to address the challenges in current computing arena arising in Software Industry, Academia and Research & Development laboratories.

Mission Statements:

1. Excellence in Teaching and Research.
2. Assist in all e-Governance Initiatives in the University.
3. Interaction with Industries and Research organizations.

CENTRAL UNIVERSITY OF KARNATAKA, KALABURAGI
PROPOSED MODEL CURRICULUM COMPONENTS
Comparison of suggested breakup of AICTE and CUK Curriculum
Credit Distribution for B. Tech. Computer Science and Engineering
(AI & ML) (2024-2025 batch and onwards)

Category of Courses Proposed	Credits by CUK	AICTE Suggested Credits	Comparison
Humanities & Social Science Courses (HSC)	06	10	-4
Basic Science Courses (BSC)	19	16	3
Engineering Science Courses(ESC)	07	08	-1
Discipline Specific Courses (DSC)	84	71	13
Professional Elective Courses (PEC)	16	16	0
Open Elective Courses (OEC)	06	06	0
Employment Enhancement Courses (EEC)	30	38	-8
Total	168	165	3

- Environmental science & Indian constitution non-credit course according to AICTE.

GENERAL COURSE STRUCTURE & THEME

Semester	HSC	BSC	ESC	DSC	PEC	OEC	EEC	Total
SEM I	3	6	4	6	-	-	-	19
SEM II	1	10	3	6	-	-	-	20
SEM III	2	3	-	18	-	-	-	23
SEM IV	-	-	-	20	-	-	-	20
SEM V	-	-	-	14	4	3	3	24
SEM VI	-	-	-	16	4	-	3	23
SEM VII	-	-	-	4	4	3	12	23
SEM VIII	-	-	-	-	4	-	12	16
Total	6	19	7	84	16	6	30	168

□ Category-wise Courses

HUMANITIES & SOCIAL SCIENCES COURSES [HSC]

1. Number of Humanities & Social Science Courses: 3
2. Credits: 6

Sl. No.	Course Code	Course Title	Mode			Total Credits	Semester
			L	T	P		
1	UAICA10100	Communication Skills	2	0	2	3	Semester I
2	UAIPA20100	Design Thinking	0	0	2	1	Semester II
3	UAICA30200	Universal Human Values	2	0	0	2	Semester III
Total Credits						6	

BASIC SCIENCE COURSES [BSC]

1. Number of Basic Science Courses: 6
2. Credits: 19

Sl. No.	Course Code	Course Title	Mode			Total Credits	Semester
			L	T	P		
1	UAITC20103	Engineering Physics	3	0	0	3	Semester II
2	UAITC10101	Engineering Mathematics I	3	0	0	3	Semester I
3	UAITC10100	Engineering Chemistry	3	0	0	3	Semester I
4	UAITC20104	Engineering Mathematics II	3	0	0	3	Semester II
5	UAITC20106	Discrete Mathematical Structures	3	1	0	4	Semester II
6	UAITC30200	Mathematical Concepts for AI	3	0	0	3	Semester III
Total Credits						19	

ENGINEERING SCIENCE COURSES [ESC]

1. Number of Engineering Science Courses: 3
2. Credits: 7

Sl. No.	Course Code	Course Title	Mode			Total Credits	Semester
			L	T	P		
1	UAICC10100	Basic Electrical Engineering	2	0	2	3	Semester I
2	UAIPC10100	Computer Aided Engineering Graphics	0	0	2	1	Semester I
3	UAICC20101	Basic Electronics	2	0	2	3	Semester II
Total Credits						7	

Discipline Specific Courses [DSC]

1. Number of Discipline Specific Courses: 24
2. Credits: 84

Sl. No.	Course Code	Course Title	Mode			Total Credits	Semester
			L	T	P		
1	UAITC10102	Programming for Problem solving	3	1	0	4	Semester I
2	UAIPC10101	Lab on Programming for Problem solving	0	0	4	2	Semester I
3	UAITC20105	Object-Oriented Programming using Java	3	1	0	4	Semester II
4	UAIPC20102	Lab on OOPs using Java	0	0	4	2	Semester II
5	UAITC30201	Computer Organization and Architecture	3	1	0	4	Semester III
6	UAITC30202	Data Structures	3	1	0	4	Semester III
7	UAITC30203	Artificial Intelligence	3	1	0	4	Semester III
8	UAICC30200	Python Programming	3	0	2	4	Semester III
9	UAIPC30200	Lab on Data Structures	0	0	4	2	Semester III
10	UAICC40201	Introduction to Machine Learning	3	0	2	4	Semester IV
11	UAITC40204	Design & Analysis of Algorithms (DAA)	3	1	0	4	Semester IV
12	UAITC40205	Software Engineering Principles	3	0	0	3	Semester IV
13	UAICC40202	Computer Networks	3	0	2	4	Semester IV
14	UAITC40206	Operating Systems	3	0	0	3	Semester IV
15	UAIPC40201	Lab on DAA	0	0	4	2	Semester IV
16	UAITC50300	Deep Learning	3	1	0	4	Semester V
17	UAICC50300	Database Management Systems	3	0	2	4	Semester V
18	UAITC50301	Theory of Computation	3	1	0	4	Semester V
19	UAIPC50300	Lab on Deep Learning	0	0	4	2	Semester V
20	UAICC60301	Advanced Machine Learning	3	0	2	4	Semester VI
21	UAICC60302	Data & Visual Analytics in AI	3	0	2	4	Semester VI

22	UAITC60302	Optimization Technique in Machine Learning	3	1	0	4	Semester VI
23	UAICC60303	Natural Language Processing	3	0	2	4	Semester VI
24	UAITC70400	Soft Computing	3	0	2	4	Semester VII
Total Credits						84	

Professional Elective Courses (PEC)

1. Number of Professional Elective Courses: 4
2. Credits: 16

Sl. No.	Course Code	Course Title	Mode			Total Credits	Semester
			L	T	P		
1	UAITL50XXX	Professional Elective-I	3	1	0	4	Semester V
2	UAITL60XXX	Professional Elective-II	3	1	0	4	Semester VI
3	UAITL70XXX	Professional Elective-III	3	1	0	4	Semester VII
4	UAITL80XXX	Professional Elective IV	3	1	0	4	Semester VIII
Total Credits						16	

Open Elective Courses (OEC)

1. Number of Open Elective Courses: 2
2. Credits: 6

Sl. No.	Course Code	Course Title	Mode			Total Credits	Semester
			L	T	P		
1	UAICO50XXX	Open Elective I	2	0	2	3	Semester V
2	UAICO70XXX	Open Elective II	2	0	2	3	Semester VII
Total Credits						6	

Employment Enhancement Courses (EEC)

1. Number of Employment Enhancement Courses: 6
2. Credits: 30

Sl. No.	Course Code	Course Title	Mode			Total Credits	Semester
			L	T	P		
1	UAIPR50300	Mini project	-	-	-	3	Semester V
2	UAIPR60301	Mini project	-	-	-	3	Semester VI
3	UAIPR70400	Technical Seminar	-	-	-	2	Semester VII
4	UAIPR70400	Industrial/Research Internship	-	-	-	6	Semester VII
5	UAIPR70401	Capstone Project Phase I	-	-	-	4	Semester VII
6	UAIPR80402	Capstone Project Phase II	-	-	-	12	Semester VIII
Total Credits						30	

COURSE STRUCTURE - FIRST YEAR B. TECH
COMPUTER SCIENCE & ENGINEERING (AI & ML)

Name of the School: Computer Sciences
Name of the Department: Computer Science
Programme Code: AI

I SEMESTER							
Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Basic Science Courses	UAITC10100	Engineering Chemistry	3	0	0	3
2	Basic Science Courses	UAITC10101	Engineering Mathematics I	3	0	0	3
3	Discipline Specific Courses	UAITC10102	Programming for Problem solving	3	1	0	4
4	Engineering Science Courses	UAICC10100	Basic Electrical Engineering	2	0	2	3
5	Humanities & Social Science Courses	UAICA10100	Communication Skills	2	0	2	3
6	Audit Course	UAITA10100	Environmental Science	2	0	0	0
7	Engineering Science Courses	UAIPC10100	Computer Aided Engineering Graphics	0	0	2	1
8	Discipline Specific Courses	UAIPC10101	Lab on Programming for Problem solving	0	0	4	2
Total				15	1	10	19

II SEMESTER							
Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Basic Science Course	UAITC20103	Engineering Physics	3	0	0	3
2	Basic Science Course	UAITC20104	Engineering Mathematics II	3	0	0	3
3	Discipline Specific Course	UAITC20105	Object-Oriented Programming using Java	3	1	0	4
4	Engineering Science Course	UAICC20101	Basic Electronics	2	0	2	3
5	Basic Science Course	UAITC20106	Discrete Mathematical Structures	3	1	0	4
6	Humanities & Social Science Course	UAIPA20100	Design Thinking	0	0	2	1
7	Discipline Specific Course	UAIPC20102	Lab on OOPs using Java	0	0	4	2
Total				14	2	6	20

Note: HSC-Humanities & Social Science Course, BSC-Basic Science Course, ESC-Engineering Science Course, DSC-Discipline Specific Course, AC- Audit Course, OEC-Open Elective Courses.

- Audit Courses are mandatory non-credit courses.

**COURSE STRUCTURE – SECOND YEAR B. TECH
COMPUTER SCIENCE & ENGINEERING (AI & ML)**

Name of the School: Computer Sciences

Name of the Department: Computer Science

Programme Code: AI

III SEMESTER							
Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Basic Science Courses	UAITC30200	Mathematical Concepts for AI	3	0	0	3
2	Discipline Specific Course	UAITC30201	Computer Organization and Architecture	3	1	0	4
3	Discipline Specific Course	UAITC30202	Data Structures	3	1	0	4
4	Discipline Specific Course	UAITC30203	Artificial Intelligence	3	1	0	4
5	Discipline Specific Course	UAICC30200	Python Programming	3	0	2	4
6	Humanities & Social Science Course	UAICA30200	Universal Human Values	2	0	0	2
7	Discipline Specific Course	UAIPC30200	Lab on Data Structures	0	0	4	2
Total				17	3	6	23

IV SEMESTER							
Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Discipline Specific Courses	UAICC40201	Introduction to Machine Learning	3	0	2	4
2	Discipline Specific Course	UAITC40204	Design & Analysis of Algorithms (DAA)	3	1	0	4
3	Discipline Specific Course	UAITC40205	Software Engineering Principles	3	0	0	3
4	Discipline Specific Course	UAICC40202	Computer Networks	3	0	2	4
5	Discipline Specific Course	UAITC40206	Operating Systems	3	0	0	3
6	Audit Course	UAITA40101	Indian Constitution	2	0	0	0
7	Discipline Specific Course	UAIPC40201	Lab on DAA	0	0	4	2
Total				17	1	8	20

COURSE STRUCTURE - THIRD YEAR B. TECH
COMPUTER SCIENCE & ENGINEERING (AI & ML)

Name of the School: Computer Sciences

Name of the Department: Computer Science

Programme Code: AI

V SEMESTER							
Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Discipline Specific Course	UAITC50300	Deep Learning	3	1	0	4
2	Discipline Specific Course	UAICC50300	Database Management Systems	3	0	2	4
3	Discipline Specific Course	UAITC50301	Theory of Computation	3	1	0	4
4	Professional Elective Course	UAITL50XXX	Professional Elective-I	3	1	0	4
5	Open Elective Course	UAICO50XXX	Open Elective I	2	0	2	3
6	Discipline Specific Course	UAIPC50300	Lab on Deep Learning	0	0	4	2
7	Employment Enhancement Course	UAIPR50300	Mini project	-	-	-	3
Total				14	3	8	24
Any one course from following options can be opted under "Open Elective-I"							
1. Internet of Thing (IoT) 2. Robotics							
For Professional Elective Courses, A Student can opt for any one subject out of available subjects defined in Professional Elective Table .							

VI SEMESTER							
Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Discipline Specific Courses	UAICC60301	Advanced Machine Learning	3	0	2	4
2	Discipline Specific Courses	UAICC60302	Data & Visual Analytics in AI	3	0	2	4
3	Discipline Specific Courses	UAITC60302	Optimization Technique in Machine Learning	3	1	0	4
4	Discipline Specific Courses	UAICC60303	Natural Language Processing	3	0	2	4
5	Professional Elective Course	UAITL60XXX	Professional Elective-II	3	1	0	4
6	Employment Enhancement Course	UAIPR60301	Mini project	-	-	-	3
Total				15	2	6	23
A Student can opt for any one subject out of available subjects defined in Professional Elective Table on Professional Elective Courses provided he/she has not taken that particular subject in Professional Elective – I							

*Course Type: Major, Minor, MDC, AEC, SEC, VAC etc

COURSE STRUCTURE - FOURTH YEAR B. TECH
COMPUTER SCIENCE & ENGINEERING (AI & ML)

Name of the School: Computer Sciences
Name of the Department: Computer Science
Programme Code: AI

VII SEMESTER

Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Discipline Specific Courses	UAITC70400	Soft Computing	3	0	2	4
2	Professional Elective Course	UAITL70XXX	Professional Elective-III	3	1	0	4
3	Open Elective Course	UAICO70XXX	Open Elective II	2	0	2	3
4	Employment Enhancement Course	UAIPR70400	Technical Seminar	-	-	-	2
5	Employment Enhancement Course	UAIPR70400	Industrial/Research Internship	-	-	-	6
6	Employment Enhancement Course	UAIPR70401	Capstone Project Phase I	-	-	-	4
Total				8	1	9	23

Any one course from the following options can be opted under 'Open Elective - II':

1. Machine Learning with Python
2. AI for everyone

A Student can opt for any one subject out of the available subjects defined in the **Professional Elective Table** on Professional Elective Courses provided he/she has not taken that particular subject in Professional Elective – I/II

Minimum 8 weeks of Industrial/Research Internship has to be completed during vacations in either offline or virtual mode.


VIII SEMESTER

Sr. No	Course Type	Course code	Course Title	Mode			Credits
				L	T	P	
1	Professional Elective Course	UAITL80XXX	Professional Elective IV	3	1	0	4
2	Employment Enhancement Course	UAIPR80402	Capstone Project Phase II	-	-	-	12
Total				3	1	0	16

A Student can opt for any one subject out of available subjects defined in **Professional Elective Table** on Professional Elective Courses provided he/she has not taken that particular subject in Professional Elective – I/II/III

Professional Elective IV may be taught in online mode for the students doing Capstone Project Phase II outside the CUK, However, the Evaluation should be done in offline mode only.

*Course Type: Major, Minor, MDC, AEC, SEC, VAC etc

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Professional Electives (4 Credits)

S. No	Course Code	Courses	L:T:P
1	UAITLX0400	Statistical Thinking for Data Science	3:1:0
2	UAITLX0401	Machine Learning for Data Science	3:1:0
3	UAITLX0402	Data Visualization	3:1:0
4	UAITLX0403	Big Data Analytics	3:1:0
5	UAITLX0404	Solve Business Problems with AI	3:1:0
6	UAITLX0405	Pattern Recognition & Visual Recognition	3:1:0
7	UAITLX0406	Image and Video Processing	3:1:0
8	UAITLX0407	Deep Learning for Computer Vision	3:1:0
9	UAITLX0408	Autonomous Systems	3:1:0
10	UAITLX0409	Bioinformatics	3:1:0
11	UAITLX0410	Genome Sequencing	3:1:0
12	UAITLX0411	Algorithms for DNA Sequencing	3:1:0
13	UAITLX0412	Computational Neuroscience	3:1:0
14	UAITLX0413	AI in Gaming	3:1:0
15	UAITLX0414	AI in Healthcare	3:1:0
16	UAITLX0415	AI in Finance	3:1:0
17	UAITLX0416	Predictive Analytics	3:1:0

Open Electives (3 Credits)

S. No	Course Code	Courses	L:T:P
1	UAICOX0400	IOT	2:0:2
2	UAICOX0401	Robotics	2:0:2
3	UAICOX0402	Machine Learning with Python	2:0:2
4	UAICOX0403	AI for Everyone	2:0:2



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School of Computer Sciences

Dept.: CS

B. Tech Course
Structure & Syllabus

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CONTENT/SYLLABUS

SEMESTER- II

Engineering Physics			
Semester:	II	Internal Assessment	30
Course Code:	UAITC20103	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	3:0:0	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

Basic Physics

COURSE OUTCOMES

After completion of this course the student will be able to

- CO-1: Solve 1 D problems in quantum mechanics
- CO-2: Explain the basis of energy bands and gaps in solids and semiconductors
- CO-3: Analyze and solve problem involving variety of wave phenomena
- CO-4: Apply principles of electromagnetism and Maxwells equation to simple systems
- CO-5: Explain principles and techniques used in the field of nanoscience

DETAILED SYLLABUS

UNIT-I

Waves and Oscillations: Rectilinear motion, Oscillations or Vib rations, Simple Harmonic Motion, Damped Harmonic motion: Real oscillatory system, Forced or Driven oscillation, Types of Wave; Superposition of Waves, Reflection and Refraction, Standing Waves and Normal Modes, Beats, Resonance, Doppler's Effect

UNIT-II

Electricity and Magnetism: Physical concepts of gradient, divergence, and curl; Laplacian operator, Concept of electricity and magnetism, Coulomb's law, The Lorentz force, Maxwell's equations

UNIT-III

Introduction to Solids and Semiconductors: Introduction to Quantum Mechanics, Free electron theory of metals, Fermi level, density of states in 1, 2 and 3 dimensions, Kronig Penney model and origin of energy bands, metals, semiconductors, and insulators.

UNIT-IV

Introduction to nanoscience: Origin of nanoscience, nanoscale, surface to volume ratio, quantum confinement, dominance of electromagnetic forces, random molecular motion, bottom-up fabrication:

Sol-gel, CVD and PVD techniques, top-down fabrication: ball mill method, characterization by XRD, SEM and TEM.

Reference Books

1. G. Main, "Vibrations and waves in physics", Cambridge University Press, 1993.
2. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006.
3. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago, 1997.
4. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore, 1988.
5. B.G. Streetman, "Solid State Electronic Devices", Prentice Hall of India, 1995.

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CONTENT/SYLLABUS

SEMESTER- I

Engineering Mathematics I			
Semester:	I	Internal Assessment	30
Course Code:	UAITC10101	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	3:0:0	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

Basic Mathematics

COURSE OUTCOMES

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

- CO-1: Solve the consistent system of linear equations
- CO-2: Apply orthogonal and congruent transformations to a quadratic form
- CO-3: Determine the power series expansion of a given function
- CO-4: Find the maxima and minima of multivariable functions
- CO-5: Solve arbitrary order linear differential equations with constant coefficients
- CO-6: Apply the concepts in solving physical problems arising in engineering

DETAILED SYLLABUS

UNIT-I

Matrix Theory: Linear dependence and independence of vectors; Rank of a matrix; Consistency of the system of linear equations; Eigenvalues and eigenvectors of a matrix; Caley Hamilton theorem and its applications; Reduction to diagonal form; Reduction of a quadratic form to canonical form - orthogonal transformation and congruent transformation; Properties of complex matrices - Hermitian, skew-Hermitian and Unitary matrices.

UNIT-II

Differential Calculus: Taylor's theorem with remainders; Taylor's and Maclaurin's expansions; Asymptotes; Curvature; Curve tracing; Functions of several variables - partial differentiation; total differentiation; Euler's theorem and generalization; Change of variables - Jacobians; maxima and minima of functions of several variables (2 and 3 variables) - Lagrange's method of multipliers.

UNIT-III

Ordinary differential equations of first order: Formation of differential equations; variable separable equations; homogeneous and non-homogeneous equations; exact and non-exact equations; integrating factors; linear first order equations; Bernoulli's equation; applications Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories.

UNIT-IV

Linear Differential Equations of Higher order: Definition, Complete solution, Operator D, Rules for finding complementary function, Inverse operator, Rules for finding particular integral, Method of variation of parameters, Cauchy's and Legendre's linear equations, Simultaneous linear equations with constant coefficients and applications of linear differential equations to oscillatory Electrical Circuits L-C, LCR – Circuits.

Reference Books

1. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Fifth Edition, Narosa Publishing House, 2016
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Eighth Edition, John Wiley and Sons, 2015
3. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 2015



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School of Computer Sciences

Dept.: CS

B. Tech Course
Structure & Syllabus

2024-25

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CONTENT/SYLLABUS

SEMESTER- I

Programming for Problem solving			
Semester:	I	Internal Assessment	40
Course Code:	UAITC10102	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:1:0	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

None

COURSE OUTCOMES

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

CO1: Formulate simple algorithms for arithmetic and logical problems.

CO2: Test and execute the C programs and correct syntax and logical errors.

CO3: Apply programming constructs of C language to solve the real-world problem.

CO4: Design and develop solutions to problems using modular programming constructs using functions

CO5: Apply user defined data structures like arrays, structures, unions and pointers in implementing solutions.

DETAILED SYLLABUS

UNIT-I

Introduction to Programming: Introduction to Computer, Components of a Computer System, Evolution of languages- Machine languages, Assembly languages, High-level languages. Software basics and its types. System software's like operating system, compiler, linker, loader; Application programs like editor.

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples.

UNIT-II

Introduction to 'C' Programming Language: History of C Programming, Basic structure of C program, Executing a C program, Constants, Variables and Data types, Operators and Expressions, Programming examples and exercises.

UNIT-III

Managing Input and Output operations: Simple input and output with scanf and printf, formatted

I/O, and Command line arguments.

Conditional Branching and Loops: Conditional branching Statements (if, if-else, nested if-else and switch statements) in C, Loop control statements (For, while-do, do-while) in C, break and continue, Programming examples and exercises.

UNIT-IV

Arrays, Strings and Functions:

Arrays: Concepts, Using Arrays (1-D and 2-D) in C, Array Applications, Searching and Sorting algorithms (Linear search, Binary Search, Selection and Bubble Sort), example programs.

Strings: Introduction to strings in C, handling strings as array of characters, basic string functions available in C, arrays of strings.

Functions: Functions in C, user defined functions, Argument Passing – call by value, call by reference, Recursion, Programming examples and exercises.

Storage Classes: Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.

UNIT-V

Structures, Unions and Pointers, Preprocessor Directives:

Structures: Basics of structures, Definition and Initialization of structures, unions, Array of structures, example programs.

Pointers: Idea of pointers, Defining pointers, pointers and functions (call by reference) arguments, pointers and arrays, example programs.

Pre-processor directives: Introduction to Preprocessors, compiler control Directives.

Reference Books

1. Jacqueline Jones & Keith Harrow: Problem Solving with C, 1st Edition, Pearson 2011
2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
3. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.
4. R S Bichkar, Programming with C, University Press, 2012.
5. Let us C ,Yashwanth Kanethkar, 13th Edition, BPB Publications.



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COU**RSE****CONTENT/SYLLABUS****SEMESTER- I**

Basic Electrical Engineering			
Semester:	I	Internal Assessment	30
Course Code:	UAICC10100	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	2:0:2	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

None

COURSE OUTCOMES

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

CO-1: Apply basic laws and analyze DC electrical circuits.

CO-2: Apply basic laws and analyze AC electrical circuits.

CO-3: Understand electrical machines working principle and their applications.

CO-4: Understand domestic electrical safety, wiring and different measuring instrument.

DETAILED SYLLABUS**UNIT-I**

Basics of DC Circuits: D. C. Circuits covering, Ohm's Law and Kirchhoff's Laws; Analysis of series, parallel and series-parallel circuits; Power and energy; Electromagnetism, Faradays Laws, Lenz's Law, Fleming's Rules, Statically and dynamically induced EMF.

UNIT-II

Basics of AC Circuits: Single Phase A.C. Circuits covering, Generation of sinusoidal voltage-definition of average value, root mean square value, form factor and peak factor of sinusoidal voltage and current and phasor representation of alternating quantities.

UNIT-III

Electrical Machines and Electrical safety

DC Machines: Working principle of DC machine as a generator and a motor.

AC Machines: Transformers, Principle of operation and construction of single phase


transformers. Electrical safety, wiring and different measuring instrument

List of Experiments

1. Understanding basic electrical components, tools, domestic wiring and meters.
2. Demonstration of cut-out sections of AC & DC machines.
3. Verification of KCL and KVL for DC Circuit.
4. Two way and three-way control of lamp and formation of truth table.
5. Demonstration of significance of Pipe and Plate Earthing

Reference Books

1. RituSahdev (2022), Basic Electrical Engineering, Khanna Book Publishing.
2. Nagrath I.J. and D. P. Kothari (2001), Basic Electrical Engineering, Tata McGraw Hill.

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CONTENT/SYLLABUS

SEMESTER- I

Communication Skills			
Semester:	I	Internal Assessment	30
Course Code:	UAICA10100	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	2:0:2	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

None

COURSE OUTCOMES

After completion of course, students would be able to:

CO-1: Understand various technical writing skills and

CO-2: Apply the technical writing and communication skills in their academic and professional life.

CO-3: Gain self-confidence with improved command over English.

CO-4: Understand the technical aspects of communication for better performance in extra curricular activities, recruitment process and prospective jobs.

DETAILED SYLLABUS

UNIT-I

Fundamentals of Communication Skills: Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing, Technical Communication, Tools of Effective Communication.

UNIT-II

Writing Skills: Basics of Grammar – Placing of Subject and Verb, Parts of Speech, Uses of Tenses, Active Passive, Narration.

UNIT-III

Vocabulary Building and Writing: Word Formation & Synonyms, Antonyms, Words Often Confused, One-Word Substitutes, Idioms and Phrasal Verbs, Abbreviations of Scientific and Technical Words.

UNIT-IV

Speaking Skills: 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).

Technical Writing: Job Application, CV Writing, Business Letters, Memos, Minutes, Notices, Report Writing & Structure, E-mail Etiquette, Blog Writing.

Reference Books

1. "The Essence of Effective Communication", Ludlow R. and Panton F., Pubs: Prentice Hall, 1992
2. "Effective Communication Skills", Kulbhushan Kumar, Khanna Publishing House, 2019.
3. "A University Grammar of English", Quirk R. and Sidney G., 3rd Edition, Pubs: Pearson Education, 2008
4. "High School English Grammar", Wren and Martin, Pubs: S. Chand & Company Ltd, 2007
5. "Essentials of Business Communication", Guffrey M.E., 8th Edition, Pubs: South-Western College Publishing, 2009
6. "Technical Communication: Principles and Practice", Raman M. and Sharma S., 2nd Edition, Pubs: Oxford University Press, 2012
7. "Effective Business Communication", Rodrigues M.V., Pubs: Concept Publishing Company, Delhi, 2003
8. "English Vocabulary in Use", McCarthy M. and Felicity O' Dell, 2nd Edition, Pubs:2010



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CONTENT/SYLLABUS

SEMESTER- I

Environmental Science			
Semester:	I	Internal Assessment	20
Course Code:	UAITA10100	End Sem. Exam	30
Teaching Hours/Week (L:T:P):	2:0:0	Exam Duration (Hours)	2
Credits: 2			

PREREQUISITE(S)

- Concept of environment.
- Basics of environment, ecology and technology.

COURSE OUTCOMES

After completing this Course, the students should be able to:

CO-1: Identify the Components of Environment Ecosystem: Types & Structure, Scope and the Impacts of Agriculture & Housing, Industry, Mining & Transportation.

CO-2: Ascertain the importance of. Natural Resources and different types of Energy.

CO-3: Comprehend the Environmental Pollutions and Global Environmental Issues.

CO-4: Examine the Air Pollution & Automobile Pollution their Effects and Solid Waste Management their sources, Characteristics.

DETAILED SYLLABUS

UNIT-I

Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, And Economic & Social Security. Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation. Environmental Impact Assessment, Sustainable Development.

RBT Levels: L1, L2.

UNIT-II

Natural Resources, Water resources: Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water Mineral resources, Forest Wealth Material Cycles – Carbon Cycle, Nitrogen Cycle & Sulphur Cycle. Energy: Different types of energy, Conventional sources & Non-Conventional sources of energy Solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy.

RBT Levels: L1, L2.

UNIT-III

Environmental Pollution: Water Pollution, Noise pollution, Land Pollution, Public Health Aspects. Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Waste Water Management.

RBT Levels: L1, L2.

UNIT-IV

Air Pollution & Automobile Pollution: Definition, Effects – Global Warming, Acid rain & Ozone layer depletion, controlling measures. Solid Waste Management, E - Waste Management & Biomedical Waste Management - Sources, Characteristics & Disposal methods.

RBT Levels: L1, L2, L3.

Reference Books

1. Raman Sivakumar, “Principals of Environmental Science and Engineering”, Second Edition, Cengage learning Singapore, 2005 63 64 2.
2. P. Meenakshi, “Elements of Environmental Science and Engineering”, Prentice Hall of India Private Limited, New Delhi, 2006
3. S.M. Prakash, “Environmental Studies”, Elite Publishers Mangalore, 2007 4. Erach Bharucha, “Text Book of Environmental Studies”, for UGC, University press, 2005
4. Erach Bharucha, “Text Book of Environmental Studies”, for UGC, University press, 2005
5. G.Tyler Miller Jr., “Environmental Science – working with the Earth”, Tenth Edition, Thomson Brooks /Cole, 2004
6. G.Tyler Miller Jr., “Environmental Science – working with the Earth”, Eleventh Edition, Thomson Brooks /Cole, 2006
7. Dr.Pratiba Sing, Dr.Anoop Singh and Dr.Piyush Malaviya, “Text Book of Environmental and Ecology”, Acme Learning Pvt. Ltd. New Delhi



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CONTENT/SYLLABUS

SEMESTER- I

Computer Aided Engineering Graphics			
Semester:	I	Internal Assessment	10
Course Code:	UAIPC10100	End Sem. Exam	15
Teaching Hours/Week (L:T:P):	0:0:2	Exam Duration (Hours)	1
Credits: 1			

PREREQUISITE(S)

None

COURSE OUTCOMES

After studying this course the student will be able to

CO-1: Understand the points with all quadrant systems.

CO-2: Understand the lines drawing in first quadrant systems.

CO-3: Apply the concepts of planes to draw the projections.

DETAILED SYLLABUS

UNIT-I


Introduction to Computer Aided Sketching: Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Introduction to Solid Edge standard toolbar/menus. Co-ordinate system, points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning conventions.

UNIT-II

Orthographic Projections: Projections of points, Projections of straight lines (First Angle Projection), True and apparent lengths and Projections of plane surfaces.

Reference Books

1. Bhatt N.D., Panchal V.M. & Ingle P.R. (2014), Engineering Drawing, Charotar Publishing House.
2. A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.
3. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer
4. Graphics for Design and Production- by Luzadder Warren J., Duff John M., Eastern Economy
5. Edition, 2005- Prentice Hall of India Pvt. Ltd., New Delhi.
6. Engineering Graphics by K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.
7. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
8. Agrawal B. & Agrawal C.M. (2012), Engineering Graphics, TMH Publication
9. Engineering Graphics & Design, A.P. Gautam & Pradeep Jain Khanna Publishing House
10. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.
(Corresponding set of) CAD Software Theory and User Manuals.
11. <https://nptel.ac.in/courses/112/103/112103019/#> (online resource)

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CONTENT/SYLLABUS

SEMESTER- I

Programming for Problem Solving Lab			
Semester:	I	Internal Assessment	20
Course Code:	UAIPC10101	End Sem. Exam	30
Teaching Hours/Week (L:T:P):	0:0:4	Exam Duration (Hours)	2
Credits: 2			

PREREQUISITE(S)

None

COURSE OUTCOMES

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

- CO1: Develop algorithms, flowchart and C programs for solving problems.
- CO2: Identify and correct the syntax and logical errors of the program.
- CO3: Construct a programming solution to the given real-world problem using C.
- CO4: Design and develop modular programming skills.
- CO5: Demonstrate use of arrays, strings, structures, unions and pointers in problem solving.

LABORATORY PROGRAMS

PART-A

1. Program to find the Biggest of 3 numbers.
2. Program to simulate the Simple calculator (Addition, subtraction, multiplication, division and modulo).
3. Program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
4. Program to read an integer 'n' and print whether 'n' is a prime number or not.
5. Program to find the reverse of a positive integer and check for palindrome or not. Display appropriate messages.
6. Program to generate the Floyds triangle.
7. Program to Implement the Linear Search.
8. Program to Sort the given set of N numbers using Selection Sort.
9. Program to Sort the given set of N numbers using Bubble sort.
10. Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.

PART-B

1. Program to implement Binary Search on Integers / Names.
2. Program to implement Matrix multiplication and validate the rules of multiplication.
3. Program to implement using functions to check whether the given number is prime or not and display appropriate messages.
4. Program to implement Recursive function to generate Fibonacci series.
5. Program to implement structures to read, write and compute average- marks and the students scoring above and below the average marks for a class of N students.
6. Develop a program using pointers to compute the sum, mean and standard deviation of allelements stored in an array of N real numbers.

NOTE: Students are allowed to pick one program from PART-A and one program from PART-B and are given equal opportunity. So, students have to write and execute two programs in total.

COURSE ASSESSMENT

A. Internal Assessment: 20 Marks

Marks Distribution (Subjected to change based on the decision of faculty in charge):

- IA + Preparation of lab manual = 15 + 5 = 20 Marks
- One internal assessment (IA) of 15 marks will be conducted for each part (A & B) and average marks of two IA will be considered.
- Marks distribution for 15 marks IA in each part:
Procedure + Execution + Viva = 3+9+3 = 15
- Remaining 5 marks will be given for writing lab manual consisting of Algorithm, Flowchart, Program and outputs for every experiment.

B. End Semester Examination: 30 Marks

- Students are allowed to pick one program from PART-A and one program from PART-B and are given equal opportunity. So, students have to write and execute two programs in total.
- **Marks Distribution**
 - I. PART-A Experiment – Procedure + Execution + Viva = 3 + 9 + 3 = 15 Marks
 - II. PART-B Experiment – Procedure + Execution + Viva = 3 + 9 + 3 = 15 Marks



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CONTENT/SYLLABUS

SEMESTER- I

Engineering Chemistry			
Semester:	I	Internal Assessment	30
Course Code:	UAITC10100	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	3:0:0	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

Basic Chemistry

COURSE OUTCOMES

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

CO-1: Apply the chemistry knowledge in solving engineering problems of society.

CO-2: Understand the fundamentals of electrochemistry, polymer chemistry and water technology

- CO-3: Assemble the concepts of chemistry that are in immediate need for engineering disciplines.
CO-4: Analyze various technologies available in electrochemistry, polymer chemistry, water & fuels.
CO-5: Develop problem solving skills using chemistry knowledge in an integrated approach.

DETAILED SYLLABUS

UNIT-I

Electrochemistry: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Numerical problems. Potentiometric titrations. Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery).

Corrosion: Causes and effects of corrosion, Types of corrosion, Corrosion control methods

Battery Technology: Classification of batteries, emf of batteries, Modern batteries. Fuel cells and their applications.

UNIT-II

Polymer Chemistry: Introduction, Classification of polymers, Use and disposal of polymers, Polymer terminologies, commercially important polymers with synthesis and applications (plastics, fibres, adhesives, elastomers, conducting polymers), properties of polymers Solubility, Molecular Weight, Crystallinity, Glass transition temperature, Role of additives in polymers, Reinforced plastics.

UNIT-III

Water Technology: Chemical analysis of water. Hardness of water. Determination of dissolved oxygen (DO) by Winkler or Iodometric method. Reverse osmosis. Source of water pollution. Chemical oxygen demand (COD) and Biological oxygen demand (BOD). Treatment of domestic waste. Nano-technology associated with water.

UNIT-IV

Chemical fuels: Introduction, classification with examples, calorific value-classification (HCV & LCV), determination of calorific value of solid and liquid fuels using Bomb calorimeter-numerical problems. Petroleum cracking -fluidized bed catalytic cracking. Reformation of petrol, Knocking in IC engine, its ill effects and prevention. Power alcohol and its advantages. Synthetic petrol – Bergius process. Renewable and non-renewable energies. Biofuel. Solar Energy. Nuclear fuel.

Reference Books

1. Principles of Physical Chemistry by B.R.Puri, L.R.Sharma and M.S.Pathania, Nagin Chand and Co.
2. Text book of Physical Chemistry by Soni and Dharmatha, S.Chand & Sons.
3. Text book of Polymers science by Gowarikar and Vishwanathan.
4. Corrosion Engineering by M.G.Fontana, Mc Graw Hill Publications.
5. Introduction to Nanotechnology: Charles P. Poole, Frank J. Owens.



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CONTENT/SYLLABUS

SEMESTER- II

Engineering Mathematics II			
Semester:	II	Internal Assessment	30
Course Code:	UAITC20104	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	3:0:0	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

COURSE OUTCOMES

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

CO-1: Analyze improper integrals

CO-2: Evaluate multiple integrals in various coordinate systems

CO-3: Apply the concepts of gradient, divergence and curl to formulate engineering problems

CO-4: Convert line integrals into area integrals and surface integrals into volume integrals

CO-5: Apply Laplace transforms to solve physical problems arising in engineering

DETAILED SYLLABUS

UNIT-I

Integral Calculus: Convergence of improper integrals; Beta and Gamma integrals; Differentiation under integral sign; Double and Triple integrals - computation of surface areas and volumes; change of variables in double and triple integrals.

UNIT-II


Vector Calculus: Scalar and vector fields; vector differentiation; level surfaces; directional derivative; gradient of a scalar field; divergence and curl of a vector field; Laplacian; Line and Surface integrals; Green's theorem in a plane; Stoke's theorem; Gauss Divergence theorem

UNIT-III

Laplace Transforms: Laplace transforms; inverse Laplace transforms; Properties of Laplace transforms; Laplace transforms of unit step function, impulse function, periodic function; Convolution theorem; Applications of Laplace transforms - solving certain initial value problems, solving system of linear differential equations, finding responses of systems to various inputs viz. sinusoidal inputs acting over a time interval, rectangular waves, impulses etc.

Reference Books

1. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Fifth Edition, Narosa Publishing House, 2016
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Eighth Edition, John Wiley and Sons, 2015
3. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publications, 2015

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CONTENT/SYLLABUS

SEMESTER- II

Object-Oriented Programming using Java			
Semester:	II	Internal Assessment	40
Course Code:	UAITC20105	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:1:0	Exam Duration (Hours)	2.30

Credits: 4

PREREQUISITE(S)

Students should have the knowledge of procedure oriented programming.

COURSE OUTCOMES

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

CO-1: Distinguish between object oriented paradigm and the procedure oriented paradigm. (Level 2: Understand)

CO-2: Explain the basic principles of object-oriented design. (Level 2: Understand)

CO-3: Write Java application programs using OOP principles and proper program structuring. (Level 3: Apply)

CO-4: Create packages and interfaces. (Level 6: Create)

CO-5: Apply practical experience gained in designing and constructing data models using java programming. (Level 3: Apply)

DETAILED SYLLABUS

UNIT-I

The History and Evolution of Java, C++: The Next Step, The Creation of Java, The Bytecode, The Java Buzzwords, Object-Oriented concepts, The Evolution of Java. Object-Oriented Programming, A First Simple Program,

UNIT-II

Variables and data types, Control Statements, Identifiers, Literals The Java Keywords, The Java Class Libraries. Introducing Classes, Class Fundamentals, A Simple Class, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Returning a Value, Constructors, Garbage Collection, The finalize() Method.

UNIT-III

Inheritance Basics, Member Access and Inheritance, Using super, Creating a Multilevel Hierarchy, Method Overriding, Using Abstract Classes, Using final with Inheritance, Using final to Prevent Overriding, Using final to Prevent Inheritance.

UNIT-IV

Packages and Interfaces, nested interfaces, variable in interfaces, Exception handling, exception types.

Reference Books

1. E. Balaguruswamy, Programming with Java, A primer, 4th Edition, Tata McGraw-Hill Publications.
- Herbet Schildt, The Complete Reference Java, Seventh Edition, MCGrawHill
2. Paul Deital & Harvey Deital (2015), Java: How to Program, 10th Edition, Pearson Education.
3. Robert Lafore (2002), Object Oriented Programming in C++, 4th Edition, Galgotia publications.
4. Herbert Schildt (2002), JavaTM2 the Complete Reference, 5th Edition, Tata McGraw-Hill.



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CONTENT/SYLLABUS

SEMESTER- II

Basic Electronics

Semester:	II	Internal Assessment	30
Course Code:	UAICC20101	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	2:0:2	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

None

COURSE OUTCOMES

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

CO-1: Describe the operation of Diodes and BJT

CO-2: Design and explain the construction of rectifiers, regulators, and amplifiers.

CO-3: Describe the general operating principles of optoelectronic devices and photodetectors.

CO-4: Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-flops.

DETAILED SYLLABUS

UNIT-I

Semiconductors: Bonding forces in solids, Energy bands, Metals, Semiconductors and Insulators, Direct and Indirect semiconductors, Electrons and Holes, Intrinsic and Extrinsic materials, Conductivity and Mobility, Drift and Resistance, Effects of temperature and doping on mobility, Hall Effect.

UNIT-II

Forward and Reverse biased junctions: Qualitative description of Current flow at a junction, Reverse bias, Reverse bias breakdown- Zener breakdown, avalanche breakdown, Rectifiers. Optoelectronic Devices, Photodiodes: Current and Voltage in an Illuminated Junction, Solar Cells, Photodetectors. Light Emitting Diode.

UNIT-III

Digital Electronics Fundamentals: Difference between analog and digital signals, Number system – Binary, Hexadecimal, Conversion – Decimal to binary, Hexagonal to decimal and vice-versa, Boolean Algebra, Basic to Universal gates, Half and full adder, Multiplexer, Decoder, SR and JK flip-flops, Shift register, 3 bit Ripple counter

List of Experiments

1. Analyze the I-V Characteristics of normal PN Junction.
2. Analyze the I-V Characteristics of the Zener Diode.
3. Study and Analyze the I-V Characteristics of the CE Configuration of BJT.
4. Study and Analyze the I-V Characteristics of the CB Configuration of BJT.
5. Study and Analyze the I-V Characteristics of the CC Configuration of BJT.
6. To construct a Half-wave rectifier circuit and analyze its output.

Reference Books

1. Ben. G. Streetman, Sanjay Kumar Banerjee, "Solid State Electronic Devices", 7th Edition, Pearson Education, 2016, ISBN 978-93-325-5508-2.
2. Thomas L. Floyd, "Electronic Devices" Pearson Education, 9th Edition, 2012.
3. D.P. Kothari, I.J. Nagarath, "Basic Electronics," 2nd Edn. McGraw Hill, 2018.
4. S. M. Sze, Kwok K. Ng, "Physics of Semiconductor Devices," 3rd Edition, Wiley, 2018.



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SEMESTER- II

Discrete Mathematical Structures			
Semester:	II	Internal Assessment	40
Course Code:	UAITC20105	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:1:0	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

None

COURSE OUTCOMES

After completion of course, students would be able to:

CO-1: Understand the basics of various discrete structures.

CO-2: Apply applications of discrete structures in Computer Science and Engineering.

DETAILED SYLLABUS

UNIT-I

Mathematical Reasoning: Mathematical reasoning, Propositions, Negation, disjunction and conjunction, Implication and Equivalence, Truth tables, Predicates, Quantifiers, Natural deduction, Rules of Inference, Methods of proofs, Resolution principle, Application to PROLOG.

UNIT-II

Set Theory: Paradoxes in set theory, Inductive definition of sets and proof by induction, Peano postulates, Relations, Properties of relations, Equivalence Relations and partitions, Partial orderings, Posets, Linear and well-ordered sets.

UNIT-III

Combinatorics and Functions: Elementary Combinatorics, counting techniques, Recurrence relation, Generating functions, Functions; mappings, Injection and Surjections, Composition of functions, Inverse functions, Special functions, Pigeonhole principle, Recursive function theory.

UNIT-IV

Graph Theory: Elements of graph theory, Euler graph, Hamiltonian path, trees, Tree traversals, Spanning trees, Representation of relations by graphs.

Reference Books

1. K. H. Rosen, Discrete Mathematics and applications, 6th Edition, Tata McGraw Hill 2007.
2. S.B. Singh, Discrete Structures/ 3rd Edition, Khanna Book Publishing, 2019.
3. S.B. Singh, Combinatorics and Graph Theory/ 3rd Edition, Khanna Book Publishing, 2018.
4. C. L. Liu, Elements of Discrete Mathematics, 2nd Edn., Tata McGraw-Hill 2000.
5. J.L. Mott, A. Kandel, T.P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, Second edition, Prentice Hall of India 1986.
6. W. K. Grassmann and J. P. Trembnlay, Logic and Discrete Mathematics, A Computer Science Perspective, Prentice Hall Inc 1996



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CONTENT/SYLLABUS

SEMESTER- II

Design Thinking			
Semester:	II	Internal Assessment	10
Course Code:	UAIPA20100	End Sem. Exam	15
Teaching Hours/Week (L:T:P):	0:0:2	Exam Duration (Hours)	1
Credits: 1			

PREREQUISITE(S)

None

COURSE OUTCOMES

Student will able to

- CO-1: Compare and classify the various learning styles and memory techniques and Apply them in their engineering education
- CO-2: Analyze emotional experience and Inspect emotional expressions to better understand users while designing innovative products
- CO-3: Develop new ways of creative thinking and Learn the innovation cycle of Design Thinking process for developing innovative products
- CO-4: Propose real-time innovative engineering product designs and Choose appropriate frameworks, strategies, techniques during prototype development
- CO-4: Perceive individual differences and its impact on everyday decisions and further Create a better customer experience

DETAILED SYLLABUS

UNIT-I

An Insight to Learning: Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting

Remembering Memory: Understanding the Memory process, Problems in retention, Memory enhancement techniques

UNIT-II

Emotions: Experience & Expression: Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers

Basics of Design Thinking: Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test

UNIT-III

Being Ingenious & Fixing Problem: Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving

Process of Product Design: Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design.

UNIT-IV

Prototyping & Testing: What is Prototype? Why Prototype? Rapid Prototype Development process,

Testing, Sample Example, Test Group Marketing

Celebrating the Difference: Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences

Design Thinking & Customer Centricity: Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design

Feedback, Re-Design & Re-Create: Feedback loop, Focus on User Experience, Address “ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – “Solving Practical Engineering Problem through Innovative Product Design & Creative Solution”.

Reference Books

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Harper Collins Publishers Ltd.
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons Inc
3. Brenda Laurel Design Research methods and perspectives MIT press 2003
4. Terwiesch, C. & Ulrich, K.T., 2009. Innovation Tournaments: creating and identifying Exceptional Opportunities, Harvard business press.
5. Ulrich & Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
6. Stuart Pugh, Total Design: Integrated Methods for Successful Product Engineering, Bjarki Hallgrímsson, Prototyping and model making for product design, 2012, Laurence King Publishing Ltd
7. Kevin Henry, Drawing for Product designers, 2012, Laurence King Publishing Ltd



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CONTENT/SYLLABUS

SEMESTER- II

OOPS using Java Lab			
Semester:	II	Internal Assessment	10
Course Code:	UAIPC20102	End Sem. Exam	15
Teaching Hours/Week (L:T:P):	0:0:2	Exam Duration (Hours)	1
Credits: 1			

PREREQUISITE(S)

None

COURSE OUTCOMES

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

- CO1: Develop algorithms, flowchart and Java programs for solving problems.
- CO2: Identify and correct the syntax and logical errors of the program.
- CO3: Construct a programming solution to the given real-world problem using Java.
- CO4: Design and develop modular programming skills.
- CO5: Demonstrate use of arrays, strings, structures, unions and pointers in problem solving.

LABORATORY PROGRAMS

PART-A

1. Write a Java Program to demonstrate arithmetic operation (+,-,*,/,%)
2. Write a Java Program to compute area of rectangle and circle
3. Write a Java Program to find odd and even number
4. Write a Java Program to display triangle using escape sequences
5. Write a Java Program to compute the sum of n natural numbers
6. Write a Java Program to read the input for 6 courses (MM 100), then calculate percentage and display grade
7. Write a Java Program to sort the names using String Concept
8. Write a Java Program to search an element from 2D matrix
9. Write a Java Program to demonstrate dynamic array concept called vector class (Operations: add element, delete element, search element, sort elements)
10. Write a Java Program to demonstrate static keyword with suitable real time example

PART-B

1. Write a Java Program to demonstrate single inheritance for computing percentage of 6 different courses then calculate the grade of student
2. Write a Java Program to demonstrate method overloading for flying (take-off) and landing of Plane
3. Write a Java Program to demonstrate method overriding with suitable real time example
4. Write a Java Program to demonstrate package execution with suitable real time example

5. Write a Java Program to demonstrate exception handling.
6. Write a Java Program to demonstrate exception handling with finally Keyword.
7. Write a Java Program to demonstrate exception handling with multiple catch block.
8. Write a Java Program to demonstrate user defined exception for validation of age to the voting system.
9. Write a Java Program for validation of eligibility criteria for Phd admission in CS Department using exception handling.
10. Write a Java Program to demonstrate single thread concept to check prime number.
11. Write a Java Program to demonstrate multithreading concept.
12. Write a Java Program to demonstrate multitask of ATM system.
{withdraw(),balance(),miniStatement()}.

COURSE ASSESSMENT


C. Internal Assessment: 20 Marks

Marks Distribution (Subjected to change based on the decision of faculty in charge):

- IA + Preparation of lab manual = 15 +5 = 20 Marks
- One internal assessment (IA) of 15 marks will be conducted for each part (A & B) and average marks of two IA will be considered.
- Marks distribution for 15 marks IA in each part:
Procedure + Execution +Viva = 3+9+3 = 15
- Remaining 5 marks will be given for writing lab manual consisting of Algorithm, Flowchart, Program and outputs for every experiment.

D. End Semester Examination: 30 Marks

- Students are allowed to pick one program from PART-A and one program from PART-B and are given equal opportunity. So, students have to write and execute two programs in total.
- **Marks Distribution**
 - I. PART-A Experiment – Procedure + Execution +Viva = 3 + 9 +3 =15 Marks
 - II. PART-B Experiment – Procedure + Execution +Viva = 3 + 9 +3 =15 Marks

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CONTENT/SYLLABUS

SEMESTER- III

Mathematical Concepts for AI			
Semester:	III	Internal Assessment	30
Course Code:	UAITC30200	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	3:0:0	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

None

COURSE OUTCOMES

After completion of course, students would be able to:

- CO-1: To understand the mathematical background of AI.
- CO-2: Use statistical methods to analyze and collect data.
- CO-3: Use probability and statistics to analyze data
- CO-4: Use and apply hypothesis testing on different datasets

DETAILED SYLLABUS

UNIT-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

UNIT-II

Derivatives and Optimizations: Rate of change, Introduction to limits, Continuity, finding limits, Differentiability, Derivative rules and operations, using derivatives to analyse functions, Second order derivatives, Optimization functions, Multivariate differentiation

UNIT-III

Vectors and Matrices : Introduction to vectors, Vector addition, vector multiplication, Introduction to matrices, matrix 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

UNIT-IV

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

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.

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
7. <https://www.udemy.com/course/mathematical-foundation-for-machine-learning-and-ai/>



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SEMESTER- III

Computer Organization and Architecture			
Semester:	III	Internal Assessment	40
Course Code:	UAITC30201	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:1:0	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

- The students should hold basic knowledge of Computers.
- The students should hold the skill set of basic Algebra.

COURSE OUTCOMES

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

CO-1: Summarize the concepts of Number system, Boolean algebra and Logic gates. (Level 5: Evaluate)

CO-2: Experiment on Simplification of Boolean functions and Sequential Circuits. (Level 4: Analyze) CO-3: Prepare an architectural logic and control design for the processor. (Level 3: Apply)

CO-4: Describe the basic concepts of microprocessors. (Level 2: Understand)

CO-5: Discuss the structure of memory and its components. (Level 2: Understand)

DETAILED SYLLABUS

UNIT-I

Number System: Introduction, Decimal, Binary, Octal, Hexadecimal, 1's and 2's Complements, Inter conversion of numbers, Codes: Character codes – ASCII, EBCDIC,. Binary Addition, Binary Subtraction, Signed Numbers, Addition /Subtraction of numbers in 2's complement notation, Binary Multiplication, Binary division, Floating point representation of numbers, Arithmetic operations with normalized floating point numbers.

Boolean Algebra and Logic Gates: Introduction, Basic definition, Axiomatic Definition, Basic theorem and Properties of Boolean algebra, Minterms and Maxterms, Logic Operations, Digital logic gates, IC digital logic families.

UNIT-II

Simplification of Boolean functions: Introduction, Different types of map method, product of sum simplification, NAND or NOR implementation, don't care condition,

Combinational and Sequential Circuits: Introduction, Half-adder, Full-Adder, Subtractors, Universal Gates, Flip-flops (SR, JK, D & T), Edge Triggering of Flip-Flops.

UNIT-III

Digital Components: Integrated circuits, Decoders, Encoders, Multiplexers, Registers, Shift Registers, Counters, Binary Counter with Parallel Load, Memory Unit

Basic Computer Organization and Design: Stored Program Organization and Instruction Codes, Computer Registers, Common Bus System, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output, Program Interrupt and Design of Accumulator Logic.

UNIT-IV

Input-Output Organization: Peripheral Devices, Input-Output Interface, Synchronous and Asynchronous Data Transfer, Handshaking, Modes of Transfer, Programmed I/O and Interrupt initiated I/O, Priority Interrupt, Interrupt cycle, Direct Memory Access (DMA), Serial Communication.

Memory System Design: Memory Organization, Memory Hierarchy, Main Memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache Memory and Virtual Memory.

Reference Books

1. M. Morris Mano (2007), Computer System Architecture, Prentice Hall.
2. William Stallings (2015), COArchitecture Designing for Performance, Pearson.
3. John P Hayes (1998), Computer Architecture and Organization, Tata McGraw Hill.
4. Bartee, T.C. (2001), Digital Computer Fundamentals, MC Graw Hill.
5. Mathur A.P. (1995), Introduction to Microprocessors, Tata Mc Graw Hill.



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SEMESTER- III

Data Structures			
Semester:	III	Internal Assessment	40
Course Code:	UAITC30202	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:1:0	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

- The students should hold fundamental knowledge of Computers.
- The students should hold the skill set of knowledge of programming in C.

COURSE OUTCOMES

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

CO-1: Describe representation and functions of arrays. (Level 2: Understand)

CO-2: Analyze an algorithm for searching and sorting techniques in terms of time complexity (Level 4: Analyze)

CO-3: Use stacks, linear lists and queues. (Level 3: Apply)

CO-4: Describe the Linked List (Level 2: Understand)

CO-5: Demonstrate the data structure concepts using 'C' programming. (Level 3: Apply)

DETAILED SYLLABUS

UNIT-I

Introduction: Data Structures, Classifications (Primitive & Non-Primitive), Data structure operations (Traversing, inserting, deleting, searching, and sorting). Review of Arrays. Structures: Array of structures Self-Referential Structures. Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, dynamically allocated arrays and Multidimensional Arrays. Demonstration of representation of Polynomials and Sparse Matrices with arrays.

UNIT-II

Stacks: Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays. Different representation of expression. Stack Applications: Infix to postfix conversion, Infix to prefix conversion, evaluation of postfix expression, recursion.

Queues: Definition, Array Representation of Queues, Queue Operations, Circular Queues, Queues and Circular queues, Dequeues, Priority Queues.

UNIT-III

Linked Lists: Definition, classification of linked lists. Representation of different types of linked lists in Memory, Traversing, Insertion, Deletion, Searching, Sorting, and Concatenation Operations on Singly linked list, Doubly Linked lists, Circular linked lists, and header linked lists.

Trees: Terminologies, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Applications of Linked lists – Polynomials, Sparse matrix representation. Programming Example

UNIT-IV

Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, and Searching operation on Binary search tree. Application of Trees-Evaluation of Expression. **Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Traversal methods: Breadth First Search and Depth First Search.

Hashing: Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.

Reference Books

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.
3. Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.
4. Gilberg and Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning, 2014.
5. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013
6. A M Tenenbaum, Data Structures using C, PHI, 1989



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CONTENT/SYLLABUS

SEMESTER- III

Artificial Intelligence			
Semester:	III	Internal Assessment	40
Course Code:	UAITC30203	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:1:0	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

- Students should have Basic knowledge of Statistics and modeling.
- Students should have knowledge of computers and programming.
- Students should have Analytical skills.

COURSE OUTCOMES

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

CO-1 Explain the fundamentals of Artificial Intelligence. (Level 2 Understand)

CO-2 Explain the Uninformed Searching and informed searching algorithms. (Level 2 Understand)

CO-3 Describe Knowledge representation. (Level 2 Understand)

CO-4 Solve the Gaming problems. (Level 4 Analyze)

CO-5 Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.(Level 3 Apply)

DETAILED SYLLABUS

UNIT-I

Introduction to Artificial Intelligence: History of Artificial Intelligence, What is AI, Intelligent

Agents: Agents and Environments, Rationality, nature of the environment, the structure of Agents.
Problem-solving: Problem-solving agents, Example problems, Searching for solutions

UNIT-II

Uninformed Search Strategies: Breadth-first Search, Uniform cost search, Depth-first search, Depth limited search, Iterative deepening depth-first search, Bidirectional search, Comparing uninformed Search strategies, Informed search strategies: Greedy best-first search, A* Search, AO* Search, Heuristic Function

UNIT-III

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems Knowledge, reasoning: Knowledge-based Agents, The Wumpus World, Logic, Propositional Logic, propositional Theorem Proving, Effective Propositional Model checking, agents based on Propositional logic.

UNIT-IV

First Order Logic: Representation, Syntax and semantics of FOL, Using First order Logic, Knowledge Engineering in first-order logic. Inference in First-Order Logic: Propositional vs. First-Order Inference and Lifting, Forward Chaining, Backward Chaining, Resolution . Expert systems: Introduction, basic concepts, structure of expert systems

Reference Books

1. S. Russel and P. Norvig, "Artificial Intelligence– A Modern Approach", Second Edition, Pearson Education
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education.
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers



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SEMESTER- III

Python Programming			
Semester:	III	Internal Assessment	40
Course Code:	UAICC30200	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:0:2	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

Students should have knowledge of computers and programming.

COURSE OUTCOMES

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

- CO-1 Explain the fundamentals of python programming. (Level 2 Understand)
- CO-2 Explain the basic principles of functions and modules. (Level 2 Understand)
- CO-3 Describe files handling and exception handling. (Level 2 Understand)
- CO-4 Identify and fix common errors in Python programs. (Level 4 Analyze)
- CO-5 Write codes in Python to solve mathematical or real world problems. (Level 3 Apply)

DETAILED SYLLABUS

UNIT-I

Introduction to Python Language: History of Python, What is Python mainly used for?, Strengths and Weaknesses, IDLE, Dynamic Types, Naming Conventions.

The Context of Software Development: Software, Learning Programming with Python. Values and Variables-Integer and String Values-Identifiers-User Input-String Formatting, String Values, String Operations, String Slices, String Operators

UNIT-II

Data Collections and Language Component: Numeric Data Types, Conversions, Built-in Functions, Expressions and Arithmetic- Expressions, Arithmetic Examples.

Control Flow and Syntax: range() function Indenting, if Statement, If Else Statement, elif Statement, For Loops While Loops, Loop Control Statements.

UNIT-III

List: Creating List, Traversing through List, List Methods, User input for list

Tuple: Creating Tuple, Traversing through tuple, Tuple methods

Set: Creating set, Traversing through set, set Operations, User input for set.

Dictionary : Creating Dictionary, Traversing through Dictionary, Dictionary Methods, User input for Dictionary

UNIT-IV

Functions and Modules: Introduction, Defining Your Own Functions, Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Passing Functions to a Function, Lambda function. **Objects and Classes:** Classes in Python, Principles of Object Orientation, Creating Classes, Instance Methods. `__init__` method, Inheritance.


List of Experiments

1. Write a Python code to implement the following
 - a. Calculate the probability of tossing a coin
 - b. Calculate the probability of throwing a dice
2. Write a python code to implement Matrix Operations
3. Write a python code to implement Vector Operations
4. Write a python code for data preprocessing
 - (a) Handling missing values
 - (b) Label encoding/ Onehotencoding
 - (c) Standardizing the features
 - (d) Train_test_split
 - (e) Handling Textual data(NLTK)
5. Write python code to implement Linear regression
6. Write python code to implement Logistic regression
7. Write a python code to implement Lasso and Ridge regression
8. Write a Python code to implement Support Vector Machine
9. Write a Python code to implement Multiple linear regression
10. Write a Python code to implement Gaussian distribution
11. Write a Python code to implement Multinomial
12. Write a Python code to implement Decision tree
13. Write a Python code to implement K-mean clustering
14. Write a Python code to implement agglomerative clustering
15. Write a Python code to implement Ada boosting as regression
16. Write a Python code to implement Ada boosting as classification
17. Write a Python code to implement Gradient boosting as regression
18. Write a Python code to implement Gradient boosting as classification

Reference Books

1. Charles Dierbach (2015), Introduction to Computer Science using Python, Wiley, 1st Edition ISBN-10: 81265560132015

- John Zelle (2010), Python Programming: An Introduction to Computer Science, 2nd Edition.
- Zed A. Shaw (2017), Learn Python the Hard Way Paperback, Pearson Education, 3rd Edition ISBN-10: 9332582106.
- Felix Alvaro, PYTHON, Easy Python Programming for Beginners, Your Step-By-Step Guide to Learning Python Programming.
- Paul Barry (2010), Head First Python, O' Reilly Publishers, 1st Edition, ISBN: 1449382673.

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SEMESTER- III

Universal Human Values			
Semester:	III	Internal Assessment	20
Course Code:	UAICA30200	End Sem. Exam	30
Teaching Hours/Week (L:T:P):	2:0:0	Exam Duration (Hours)	2
Credits: 2			

PREREQUISITE(S)

None

COURSE OUTCOMES

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

It is hoped that they 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. Therefore, the course and further follow up is expected to positively impact common graduate attributes like:

- Holistic vision of life

2. Socially responsible behavior
3. Environmentally responsible work
4. Ethical human conduct
5. Having Competence and Capabilities for Maintaining Health and Hygiene
6. Appreciation and aspiration for excellence (merit) and gratitude for all This is only an introductory foundational input.

It would be desirable to follow it up by

- a) Faculty-student or mentor-mentee programs throughout their time with the institution
- b) Higher level courses on human values in every aspect of living

DETAILED SYLLABUS

UNIT-I

Introduction to Value Education

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: Self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT-II

Harmony in the Human Being

Lecture 7: Understanding Human being as the Co-existence of the Self and the Body

Lecture 8: Distinguishing between the Needs of the Self and the Body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of Self and Body

Lecture 9: The Body as an Instrument of the Self

Lecture 10: Understanding Harmony in the Self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the Self

Lecture 11: Harmony of the Self with the Body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of Self with the Body

UNIT-III

Harmony in the Family and Society

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfill Human Goal

UNIT-IV

Harmony in the Nature/Existence

Lecture 19: Understanding Harmony in the Nature


Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

- Lecture 21: Realizing Existence as Co-existence at All Levels
 Lecture 22: The Holistic Perception of Harmony in Existence
 Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence
Implications of the Holistic Understanding – a Look at Professional Ethics
 Lecture 23: Natural Acceptance of Human Values
 Lecture 24: Definitiveness of (Ethical) Human Conduct
 Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct
 Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
 Lecture 26: Competence in Professional Ethics
 Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education
 Lecture 27: Holistic Technologies, Production Systems and Management Models/Typical Case Studies
 Lecture 28: Strategies for Transition towards Value-based Life and Profession
 Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, 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. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English) 13. Gandhi - Romain Rolland (English)

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CONTENT/SYLLABUS

SEMESTER- III

Lab on Data Structures			
Semester:	III	Internal Assessment	20
Course Code:	UAIPC30200	End Sem. Exam	30
Teaching Hours/Week (L:T:P):	0:0:4	Exam Duration (Hours)	2
Credits: 2			

PREREQUISITE(S)

None

COURSE OUTCOMES

CO-1: The students should be able to describe and implement various data structures including lists, arrays, stacks, queues, binary search trees, graphs, hash tables, and matrices.

CO-2: The student will be able to analyze and apply various algorithms for shortest path calculation, sorting and searching applications

LABORATORY PROGRAMS

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PART A

1. Write a c program to perform merging of two array.
2. Write a c program to insert array element at user specified position.
3. Write a c program to remove an array element from position.
4. Write a c program to perform Matrix Addition and Matrix Subtraction.
5. Write a c program to perform Matrix Multiplication.
6. Write a c program to perform Linear Search.
7. Write a c program to perform Binary Search.
8. Write a c program to perform bubble sort.
9. Write a c program to perform quick sort.
10. Write a c program to perform merge sort.
11. Write a c program to perform Stack Implementation using array.
12. Write a c program to perform Stack Implementation using a linked list.
13. Write a c program to reverse a string using stack.
14. Write a c program for conversion of an expression from Infix to Prefix.
15. Write a c program for conversion of an expression from Infix to Postfix.

PART-B

1. Write a c program to evaluate prefix expression.
2. Write a c program to evaluate postfix expression.
3. Write a c program to implement a simple queue using linked list.
4. Write a c program to implement a circular queue using linked list.
5. Write a c program to implement De-queue using array.
6. Write a c program to implement a simple queue using an array.
7. Write a c program to implement a circular queue using an array.
8. Write a c program to implement singly linked list(insert at beginning and display the list)
9. Write a c program to implement singly linked list(insert at end and display the list).
10. Write a c program to implement singly linked list(insert at specified position and display the list).
11. Write a c program to implement singly linked list (insert at end and delete at end)
12. Write a c program to implement circular linked list (insert at specified position and display the list).
13. Write a c program to implement doubly linked list.
14. Write a c program to create binary tree and traverse the tree.

COURSE ASSESSMENT

I. Internal Assessment: 20 Marks

Marks Distribution (Subjected to change based on the decision of faculty in charge):

- IA + Preparation of lab manual = 15 +5 = 20 Marks
- One internal assessment (IA) of 15 marks will be conducted for each part (A & B) and average marks of two IA will be considered.
- Marks distribution for 15 marks IA in each part:
Procedure + Execution +Viva = 3+9+3 = 15
- Remaining 5 marks will be given for writing lab manual consisting of Algorithm, Flowchart, Program and outputs for every experiment.

II. End Semester Examination: 30 Marks

- Students are allowed to pick one program from PART-A and one program from PART-B and are given equal opportunity. So, students have to write and execute two programs in total.
- **Marks Distribution**
 - I. PART-A Experiment – Procedure + Execution +Viva = 3 + 9 +3 =15 Marks
 - II. PART-B Experiment – Procedure + Execution +Viva = 3 + 9 +3 =15 Marks



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CONTENT/SYLLABUS

SEMESTER- IV

Introduction to Machine Learning			
Semester:	IV	Internal Assessment	40
Course Code:	UAICC40201	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:0:2	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

- Students should have knowledge of basic mathematics.
- Students should have knowledge of computer programming.

COURSE OUTCOMES

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

- CO-1. Describe the different forms of learning (Level 1 Remember)
- CO-2. Use the provability theory in machine learning. (Level 3 Apply)
- CO-3. Examine the classification techniques on given datasets. (Level 4 Analyze)

CO-4. Construct neural network model for machine learning. (Level 6 Create)

CO-5. Design clustering algorithms to classify given sample in machine learning. (Level 6 Create)

DETAILED SYLLABUS

UNIT-I

Machine Learning, Applications of Machine Learning, processes involved in Machine Learning, Introduction to Machine Learning Techniques: Supervised Learning, Unsupervised Learning and Reinforcement Learning, Real life examples of Machine Learning.

Data sets and Attribute types, Basic statistical descriptions of Data, Data Visualization, Measuring Data similarity and Dissimilarity.

UNIT-II

Data Preprocessing, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data discretization. Feature sets, Dataset division: test, train and validation sets, cross validation.

UNIT-III

Classification and Regression: K-Nearest Neighbor, Linear Regression, Logistic Regression, Support Vector Machine (SVM), Decision trees, Evaluation Measures: SSE, MME, R2, confusion matrix, precision, recall, F-Score, ROC-Curve.

UNIT-IV

Introduction to clustering, Types of Clustering: Hierarchical, Agglomerative Clustering and Divisive clustering; Partitional Clustering - K-means clustering.

List of Experiments

1. Mathematical computing with Python packages like: numpy, Mat- plotLib, pandas, Tensor Flow, Keras.
2. Data processing using Python packages.
3. Implement basic ML models like Decision trees, SVM, KNN, K-Means, Logistic Regression, and Linear Regression.

Reference Books

1. Introduction to Machine Learning, By Jeeva Jose, Khanna Book Publishing Co., 2020.
2. Machine Learning for Dummies, By John Paul Mueller and Luca Massaron, For Dummies, 2016.
3. Machine Learning, By Rajeev Chopra, Khanna Book Publishing Co., 2021.
4. Machine Learning: The New AI, By Ethem Alpaydin, The MIT Press, 2016.



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CONTENT/SYLLABUS

SEMESTER- IV

Design & Analysis of Algorithms (DAA)			
Semester:	IV	Internal Assessment	40
Course Code:	UAITC40204	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:1:0	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

- Students should have fundamental knowledge of programming and mathematics.
- Students should have knowledge of data structures.

COURSE OUTCOMES

At the end of the course the student will be able to:

- CO 1. Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm.
- CO 2. Apply divide and conquer approaches and decrease and conquer approaches in solving the problems analyze the same
- CO 3. Apply the appropriate algorithmic design technique like greedy method, transform and conquer approaches and compare the efficiency of algorithms to solve the given problem.
- CO 4. Apply and analyze dynamic programming approaches to solve some problems. and improve an algorithm time efficiency by sacrificing space.
- CO 5. Apply and analyze backtracking, branch and bound methods and to describe P, NP and NP-Complete problems.

DETAILED SYLLABUS

UNIT-I

Introduction: Algorithm and its Properties. Algorithm Specification-using natural language, using Pseudo code convention, Fundamentals of Algorithmic Problem solving, Analysis Framework-Time efficiency and space efficiency, Worst-case, Best-case and Average case efficiency.

Performance Analysis: Estimating Space complexity and Time complexity of algorithms.

Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ) with examples, Basic efficiency classes, Mathematical analysis of Non-Recursive and Recursive Algorithms with Examples.

Brute force design technique: Selection sort, sequential search, string matching algorithm with complexity Analysis

UNIT-II

Divide and Conquer: General method, Recurrence equation for divide and conquer, solving it using Master's theorem, Divide and Conquer algorithms: Binary search, Merge sort, Quick sort.

Decrease and Conquer Approach: Introduction, Insertion sort, Graph searching algorithms.

UNIT-III

Greedy Method: General method,

Minimum cost spanning trees: Prim's Algorithm, Kruskal's Algorithm with performance analysis.

Single source shortest paths: Dijkstra's Algorithm.

Transform and Conquer Approach: Introduction, Heaps and Heap Sort.

UNIT-IV

Dynamic Programming: General method with Examples,

Transitive Closure: Warshall's Algorithm.

All Pairs Shortest Paths: Floyd's Algorithm, Knapsack problem.

Backtracking: General method, solution using back tracking to N-Queens problem, Sum of subsets problem, **Branch and Bound:** Assignment Problem

NP-Complete and NP-Hard problems: Basic concepts, non- deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.

Reference Books

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 2nd Edition, 2009. Pearson.
2. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.
3. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
4. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)



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CONTENT/SYLLABUS

SEMESTER- IV

Software Engineering Principles			
Semester:	IV	Internal Assessment	30
Course Code:	UAITC40205	End Sem. Exam	45
Teaching Hours/Week (L:T:P):	3:0:0	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

Students should have knowledge of programming language and image processing techniques.

COURSE OUTCOMES

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

- CO-1. Explain the role of software. (Level 2 Understand)
- CO-2. Analyze the software process and project metrics. (Level 3 Apply)
- CO-3. Discuss the software project planning, management and principles. (Level 2 Understand)
- CO-4. Use the software testing techniques and strategies. (Level 3 Apply)
- CO-5. Explain the software configuration management.(Level 2 Understand)

DETAILED SYLLABUS

UNIT-I

The Product and The Process: Evolving role of software, software characteristics and components, Crisis, Software Myths, Software Engineering-A Layered Technology, Software process, linear sequential model, Prototyping model, RAD model, Evolutionary software process model. Iterative, Spiral, Agile Model

Project Management Concepts: The Management Spectrum, The People, The Product, The Process, and The Project, W5HH Principle.

Software Process and Project Metrics: Measures, Metric Indicators, Metric in process and the Project Domains ,Software Measurement, Metrics for software quality.

UNIT-II

Software Project Planning: Project Planning Objectives, Software Project Estimation, decomposition Techniques, Empirical Estimation Models.

Risk Analysis and Management: Software Risks, Risk Identification, Risk Projection, Risk Refinement and Risk Mitigation, Monitoring, and Management.

Analysis Concepts and Principles: Requirement analysis, communication techniques, analysis principles, software prototyping and specification.

UNIT-III

Analysis Modeling: Elements of analysis model, data modeling, functional modeling, behavioral modeling, the mechanics of structured analysis, data dictionary, other classical analysis methods.

Design Concepts and Principles: Software design process, design principles, design concepts, design methods, data design, architectural design and process, transform and transaction mappings, design post processing, architectural design optimization, interface design, procedural design.

Software Testing Techniques and Strategies: Fundamentals, Test case design, White box testing, Basis path testing, Control structure testing, Black box testing, Software testing strategies.

UNIT-IV

Software Configuration Management: Configuration management, maintenance costs, maintenance side effects, maintenance tissues.

Software Quality Assurance: Quality Concepts,

Software Quality Assurance, FTR, ISO 9001, ISO9002, ISO-9003, Introduction to CASE.

Reference Books

1. Software Engineering, Fifth Edition, Roger - Pressman, McGraw Hill.
2. Software Engineering , I Sommerville, International Computer Science, Series
3. Object Oriented Modeling and Design, Rumbaugh. J., Blaha M., Premerlani W., Eddy F and Lorensen W.,PHI.
4. Software Engineering, Schooma, McGraw Hill
5. Object Oriented Design and Analysis, Booch, Benjamin / Cummings.



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CONTENT/SYLLABUS

SEMESTER- IV

Computer Networks			
Semester:	IV	Internal Assessment	40
Course Code:	UAICC40202	End Sem. Exam	60
Teaching Hours/Week (L:T:P):	3:0:2	Exam Duration (Hours)	2.30
Credits: 4			

PREREQUISITE(S)

- The students should hold basic knowledge of Computer Fundamentals.
- The students should hold the skill set of basic network concepts.

COURSE OUTCOMES

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

- CO-1: Summarize the concepts of physical layer and media (Level 5: Evaluate)
- CO-2: Experiment on analog transmission and applications. (Level 4: Analyze)
- CO-3: Prepare a Computer Network and establish internet connection. (Level 3: Apply)
- CO-4: Describe the basic concept of wireless network (Level 2: Understand)

DETAILED SYLLABUS

UNIT-I

Physical Layer & Media: Analog and Digital, Periodic analog signals, Digital signals, Transmission of Digital Signals, Transmission impairment, Data rate limits, performance. Digital Transmission: Digital-to-digital conversion, analog-to-digital conversion, transmission modes Parallel Transmission Serial Transmission Analog Transmission: Digital-to-analog conversion, Analog-to-analog conversion Bandwidth Utilization: Multiplexing & Spreading.

UNIT-II

Transmission Media: Guided media, unguided media, Circuit-switched networks: Circuit-Switched Networks, Datagram networks, virtual-circuit networks, Data Link Layer: Error Detection and Correction, Block Coding, Linear block codes, cyclic codes, Checksum.

UNIT-III

Computer Networks and the Internet: Internet, Protocol, Application Layer: Network application architecture, process communication, HTTP, File Transfer: FTP, Electronic Mail in the Internet, SMTP, DNS Transport Layer: Transport-Layer Services and Principles, Multiplexing and Demultiplexing Applications, Connectionless Transport: UDP, Principles of Reliable of Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control.

UNIT-IV

Network Layer and Routing: Introduction and Network Service Model, virtual circuits and datagrams, router, Internet protocol (IP), Forwarding & Addressing in internet, Routing Algorithms, Routing in the internet, Broad & Multicast Routing. Wireless Networks: Wireless Links & Networks characteristics, Wi-Fi, Cellular Internet Access, Mobile IP, Managing mobility in cellular networks.

List of Experiments

1. Write a program for using TCP and UDP Sockets.
2. Write a simulation of sliding window protocols.
3. Write a simulation of Routing Protocols.
4. Configure given network topologies using any network simulator software.
5. Write programs for error detecting codes.
6. Write a program for Client Server Communication.

Reference Books

1. Data Communications & Networking Fourth Edition, Behrouz A Forouzan
2. Computer Networking” Third Edition, James F. Kurose, Keith W. Ross



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CONTENT/SYLLABUS

SEMESTER- IV

Operating Systems			
Semester:	IV	Internal Assessment	30
Course Code:	UAITC40206	End Sem. Exam	45

Teaching Hours/Week (L:T:P):	3:0:0	Exam Duration (Hours)	2
Credits: 3			

PREREQUISITE(S)

- The students should hold basic knowledge of computer System.
- The students should have practical knowledge of working with computers.

COURSE OUTCOMES

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

CO-1: Review the basic concepts of operating system. (Level 2: Understand)

CO-2: Illustrate the examples on processor scheduling and deadlock prevention. (Level 3: Apply)

CO-3: Justify the demand paging concepts for the comparison of page replacement algorithms.(Level 5: Evaluate)

CO-4: Describe the disk scheduling algorithms and its comparison in terms of performance. (Level 5: Evaluate)

CO-5: Review the file system and its protection mechanism. (Level 2: Understand)

DETAILED SYLLABUS

UNIT-I

Introduction to Operating System: Operating systems concepts, types of operating systems, Evolution of operating systems, different views of the operating system, operating system services, System calls, Types of system calls, operating system structure, layered approach, Micro kernels and Virtual machines.

UNIT-II

Process Management: Process and thread concept, operation on processes, Inter-process communication, process synchronization, Inter process synchronization, critical section problem, semaphores, process scheduling concepts, scheduling criteria, scheduling algorithms, deadlocks, system model, deadlock characterization, deadlock prevention, deadlock avoidance.

UNIT-III

Memory Management: Introduction, memory management, swapping, contiguous memory allocation, paging, segmentation, virtual memory, demand paging, page replacement algorithms: FIFO, Optimal, LRU, Counting based page replacement.

UNIT-IV

Disk Scheduling: Introduction, physical characteristics, disk scheduling algorithms, disk Management, RAID Structure.

File system: Files, access method, directory structure, protection and file system implementation, allocation methods.

Protection: Goals, mechanism and policies, domain of protection, access matrix and its implementation, dynamic protection structure, revocation, security.

Reference Books

1. J. Sliberschatz (2006), *Operating systems Concepts*, McGraw Hill.
2. Madnick, S.E. Donovan J.J. (1974), *Operating system*, McGraw Hill.
3. Brinch Hansen P (1973), *Operating system Principles*, PHI.
4. Milan Milenkovic (2001), *Operating systems*, McGraw Hill.
5. William Stallings (2018), *Operating system Internals and Design Principles*, Pearson.



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CONTENT/SYLLABUS

SEMESTER- IV

Indian Constitution			
Semester:	IV	Internal Assessment	-

Course Code:	UAIITA40101	End Sem. Exam	-
Teaching Hours/Week (L:T:P):	2:0:0	Exam Duration (Hours)	-
Credits: 0			

PREREQUISITE(S)

None

COURSE OUTCOMES

CO 1: Describe historical background of the constitution making and its importance for building a democratic India.

CO 2: Explain the functioning of three wings of the government i.e., executive, legislative and judiciary.

CO 3: Explain the value of the fundamental rights and duties for becoming good citizen of India.

CO 4: Analyze the decentralization of power between central, state and local self-government.

CO 5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

DETAILED SYLLABUS

UNIT-I

The Constitution – Introduction

- The History of the Making of the Indian Constitution
- Preamble and the Basic Structure, and its interpretation
- Fundamental Rights and Duties and their interpretation
- State Policy Principles

UNIT-II

Union Government

- Structure of the Indian Union
- President – Role and Power
- Prime Minister and Council of Ministers
- Lok Sabha and Rajya Sabha

UNIT-III

State Government

- Governor – Role and Power
- Chief Minister and Council of Ministers
- State Secretariat

UNIT-IV

Local Administration

- District Administration
- Municipal Corporation
- Zila Panchayat

Election Commission

- Role and Functioning
- Chief Election Commissioner
- State Election Commission

Reference Books

1. Rajeev Bhargava, Ethics and Politics of the Indian Constitution, Oxford University Press, New Delhi, 2008

2. B.L. Fadia, The Constitution of India, Sahitya Bhawan; New edition (2017)
3. DD Basu, Introduction to the Constitution of India, Lexis Nexis; Twenty-Third 2018 edition

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SEMESTER- IV

DAA Lab			
Semester:	IV	Internal Assessment	20
Course Code:	UAIPC40201	End Sem. Exam	30
Teaching Hours/Week (L:T:P):	0:0:4	Exam Duration (Hours)	2
Credits: 2			

PREREQUISITE(S)

None

COURSE OUTCOMES

After completion of this course successfully, the students will be able to:

CO-1: Develop programs to solve computational problems using suitable algorithm design strategy.

CO-2: Compare algorithm design strategies by developing equivalent programs and observing running times for analysis (Empirical).

CO-3: Make use of suitable integrated development tools to develop programs

CO-4: Choose appropriate algorithm design techniques to develop solution to the computational and complex problems.

CO-5: Demonstrate and present the development of program, its execution and running time(s) and record the results/inferences

LABORATORY PROGRAMS

1. Write a program to implement and find the time complexity of different sorting and searching techniques.
2. Write a program to find minimum cost spanning tree.
3. Write a program to implement travelling sales person problem.
4. Write a program to find Longest Path in a Directed Acyclic Graph.
5. Write a program for Shortest path with exactly k edges in a directed and weighted graph.
6. Write a program to implement knapsack problem.
7. Write a program to implement N-Queens and sum of subset problem.

COURSE ASSESSMENT

A. Internal Assessment: 20 Marks

Marks Distribution (Subjected to change based on the decision of faculty in charge):

- IA + Preparation of lab manual = 15 + 5 = 20 Marks
- One internal assessment (IA) of 15 marks will be conducted for each part (A & B) and average marks of two IA will be considered.
- Marks distribution for 15 marks IA in each part:
Procedure + Execution + Viva = 3 + 9 + 3 = 15
- Remaining 5 marks will be given for writing lab manual consisting of Algorithm, Flowchart, Program and outputs for every experiment.

B. End Semester Examination: 30 Marks

- Students are allowed to pick one program from PART-A and one program from PART-B and are given equal opportunity. So, students have to write and execute two programs in total.
- **Marks Distribution**
 - I. PART-A Experiment – Procedure + Execution + Viva = 3 + 9 + 3 = 15 Marks
 - II. PART-B Experiment – Procedure + Execution + Viva = 3 + 9 + 3 = 15 Marks