Dr. Vishwanath Karad
MIT WORLD PEACE UNIVERSITY | PUNE
TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

SYLLABUS

DR VISHWANATH KARAD
MIT - WORLD PEACE UNIVERSITY

FACULTY OF SCIENCE

Bachelor of Computer Applications

BCA (Science)

BATCH – 2020-21

Ms. Smita Patil Dr. C. H. Patil Dr. Shubhalaxmi Joshi

ROGRAMME STRUCTURE

Preamble:

At first year a course focuses on basic computer science concepts, c programming and Databases. Every trimester is having four theory subjects and a practical based on theory subjects. Along with Computer Science practical courses mini projects are included to help in building a strong foundation.

At second year for each trimester have four courses of computer science focuses on Java programming, Python, networking concepts. Practical course also includes project work which gives students hands on experience in solving a real world problem.

At third year for each trimester have four courses of computer science focuses on Android , AngularJS, Cloud Computing and recent trends in computer science and application. Practical course also includes project work which gives students hands on experience in solving a real world problem.

Intended philosophy of the syllabus is to meet following guidelines:

Give strong foundation on core Computer Science and application courses.
Expose student to emerging trends in a gradual and incremental way.
Prepare student community for the demands of ICT industry.
Offer specialization on a chosen area.
Create research temper among students in the whole process.

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Programme Head	HoS & BoS Chairmain	Associate Dean
BCA (Science)	School of Computer Science	Faculty of Science

Vision and Mission of the Programme

Vision:

To contribute to the society through excellence in scientific and knowledge-based education utilizing the potential of computer science with a deep passion for wisdom, culture and values.

Mission:

- To create knowledge, to disseminate knowledge, and to provide service to our society
- Provide quality undergraduate and graduate education in both the theoretical and applied foundations of computer science
- Train students to effectively apply this education to solve real-world problems thus amplifying their potential for lifelong high-quality careers
- To give them a competitive advantage in the ever-changing and challenging global work environment
- To achieve a distinguished position in Computer Science through innovative teaching learning methods and research.
- To develop strong fundamentals and habit of life-long learning in students to fulfill the needs of Industry

Programme Educational Objectives

- Demonstrate proficiency in the analysis of complex problems and the synthesis of solutions to those problems
- Exhibit comprehension of modern software engineering principles
- Establish a breadth and depth of knowledge in the discipline of computer science
- Prove the ability to work effectively as a team member and/or leader in an ever-changing professional environment
- To apply design and development principles in the construction of software systems of varying complexity
- To focus on ‘data science and technology’ and ‘software technology ‘to continue innovation in the future
- To prepare learners for higher positions in the IT industries
- To become successful professionals able to gain Employment and/or to be accepted into a Computer Science for post graduate programmes.

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Programme Specific Outcomes

- A graduate with a BCA in Computer Science and Application will have the ability to communicate computer science concepts, designs, and solutions effectively and professionally
- Apply knowledge of computing to produce effective designs and solutions for specific problems
- Identify, analyze, and synthesize scholarly literature relating to the field of computer science
- Use software development tools, software systems, and modern computing platforms.
- Project work gives students hands on experience in solving a real world problem.
- Students able to design dynamic website in the form of web programming.
- The Syllabus also develops requisite professional skills and problem solving abilities for pursuing a career in Software Industry.

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Programme Structure:

(a) Programme duration: 3 years full time.

(b) System followed: Trimester

(c) Credits System:

(i) Per Year

First Year – 36

Second Year – 38

Third Year - 38

(ii) Total in the programme - 112

(d) Credits for activities other than academics: NA

(e) Internship: NA.

(f) Assessment Criteria: Minimum 50% credits of first year are required to take admission in second year.

(g) Branches or Specializations: NA

(h) Mandatory Attendance to appear for examination:

It is expected on the part of the student to attend each and every Lecture, Tutorial, and Laboratory practical sessions in a course for the academic excellence. However, due to any contingencies, the attendance requirement will be a minimum of 90% of the classes scheduled/ held.

(j) Medium of Instruction and Examination: English

(k) Eligibility criteria for admission to the programme: In order to be eligible for admission to Bachelor of Computer Applications a candidate must have passed. HSC (10+2) from Science Stream with English as passing Subject with minimum 50% marks (45% for Reservation category) in aggregate. Three years Diploma of Board of Technical Education or its equivalent. Every eligible candidate has to pass Common Entrance Test to be conducted by the respective Institute/College.

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Bachelor of Computer Application
2020-21

A. Definition of Credit:-

3Hr.Lecture 1 Tutorial per week	2 credit
3HoursPractical(Lab) per week	2 credit

B. Credits:-

Total number of credits for three year undergraduate BCA Programme would be 112.

C. Structure of Credits for Undergraduate BCA Program:-

S. No.	Category	Suggested Breakup of
1	Humanities and Social Sciences and Peace Programmes including Management courses	10
2	Professional core courses including Laboratory/Mini Project Work	96
3	Elective courses	06
4	Full Time Industrial Training	NA
	Total	**112**

D. Course code and definition:-

Course code	Definitions
L	Lecture
T	Tutorial
WP	Humanities and Social Sciences and Peace Programs
SEC	Skill Enhancement Courses
BCA	Bachelor of Computer Application

E. Grading Scheme:

Grades & Grade Points Marks Out of 100	Grade	Grade Point
80-100	O: Outstanding	10
70-79	A+: Excellent	9
60-69	A: Very Good	8
55-59	B+: Good	7
50-54	B: Above Average	6
45-49	C: Average	5
40-44	Pass	4
0-39	Fail	0
Ab	Absent	NA

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B. C. A. Science (First Year) (w.e.f. 2020)

Trimester – I

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment, Marks			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Computer Fundamentals	Core	3	1		2		50		50	100
2		Programming in C	Core	3	1		2		50		50	100
3		Business communication	Core	3	1		2		50		50	100
4		Introduction to Digital Electronics	Core	3	1		2		50		50	100
5		Lab on Programming in C	Core			3		2		50	50	100
6	WPC1	World Famous Philosophers, Sages/Saints and Great Kings	SEC	3			2		70		30	100
		Total :		15	04	03	10	02	270	50	280	600

Weekly Teaching Hours: 22
Total Credits Trimester I: 12

**Assessment Marks are valid only if Attendance criteria are met
* CCA: Class Continuous Assessment
* LCA: Laboratory Continuous Assessment

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Trimester – II

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks **			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Advanced C	Core	3	1		2		50		50	100
2		Database Management System	Core	3	1		2		50		50	100
3		Discrete Mathematics	Core	3	1		2		50		50	100
4		Computer Organization & Introduction to Microprocessor	Core	3	1		2		50		50	100
5		Lab on Advanced C & DBMS	Core			6		3		50	50	100
		Total :		12	04	06	08	03	200	50	250	500

Weekly Teaching Hours: 22
Total Credits Trimester II: 11

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Trimester – III

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Data Structures using C	Core	3	1		2		50		50	100
2		Relational Database Management System	Core	3	1		2		50		50	100
3		Calculus & Matrices	Core	3	1		2		50		50	100
4		Software Engineering	Core	3	1		2		50		50	100
5		Lab on Data Structure & RDBMS	Core			6		3		50	50	100
6	WPC2	Study of Languages, Peace in Communications and Human Dynamics	SEC	3			2		70		30	100
		Total :		15	04	06	10	03	270	50	280	600

Weekly Teaching Hours: 25
Total Credits Trimester III: 13

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B. C. A. Science (Second Year) (w.e.f. 2020)

Trimester – IV

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Advanced Data Structures	Core	3	1		2		50		50	100
2		Web Technologies - I	Core	3	1		2		50		50	100
3		Computer Networks - I	Core	3	1		2		50		50	100
4		Operation Research	Core	3	1		2		50		50	100
5		Lab on Advanced Data Structures	Core			3		2		50	50	100
6		Lab on Web Technologies - I	Core			3		2		50	50	100
		Total :		12	04	06	08	04	200	100	300	600

Weekly Teaching Hours: 22
Total Credits Trimester IV: 12

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Trimester – V

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Object Oriented Programming Concepts using Java	Core	3	1		2		50		50	100
2		Web Technologies - II	Core	3	1		2		50		50	100
3		Computer Networks - II	Core	3	1		2		50		50	100
4		Operating Systems - I	Core	3	1		2		50		50	100
5		Lab on Java	Core			3		2		50	50	100
6		Lab on Web Technologies - II	Core			3		2		50	50	100
7	WPC4	Philosophy of Science and Religion/Spirituality	SEC	3			2		70		30	100
		Total :		15	04	06	10	04	270	100	330	700

Weekly Teaching Hours: 25
Total Credits Trimester V: 14

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Trimester – VI

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Advanced Java	Core	3	1	--	2		50		50	100
2		Python	Core	3	1		2		50		50	100
3		Object Oriented Software Engineering	Core	3	1		2		50		50	100
4		Operating Systems - II	Core	3	1		2		50		50	100
5		Lab on Advanced Java	Core			3		2		50	50	100
6		Lab on Python	Core			3		2		50	50	100
		Total :		12	04	06	08	04	200	100	300	600

Weekly Teaching Hours: 22
Total Credits Trimester VI: 12

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Trimester – VII

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Programming in C#	Core	3	1		2		50		50	100
2		Angular	Core	3	1		2		50		50	100
3		Information Security and Audit	Core	3	1		2		50		50	100
4		Elective- I	Elective	3	1		2		50		50	100
5		Lab on Programming in C#	Core			3		2		50	50	100
6		Lab on Angular	Core			3		2		50	50	100
7	WPC5	Indian tradition, Culture and Heritage	SEC	3			2		70		30	100
		Total :		15	04	06	10	04	270	100	330	700

Weekly Teaching Hours: 25
Total Credits Trimester VII: 14

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* LCA : Laboratory Continuous Assessment

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B. C. A. Science (Third Year) (w.e.f. 2020)

Trimester – VIII

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Mobile Application Development-I	Core	3	1		2		50		50	100
2		ASP.NET	Core	3	1		2		50		50	100
3		Basics of Cloud Computing	Core	3	1		2		50		50	100
4		Elective –II	Elective	3	1		2		50		50	100
5		Lab on Mobile Application Development-I	Core			3		2		50	50	100
6		Lab on ASP.NET	Core			3		2		50	50	100
		Total :		15	04	06	08	04	200	100	300	600

Weekly Teaching Hours: 25
Total Credits Trimester VII: 12

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B. C. A. Science (Third Year) (w.e.f. 2020)

Trimester – IX

Sr. No.	Course Code	Name of Course	Type	Weekly Workload, Hrs			Credits		Assessment Marks**			
				Theory	Tutorial	Lab	Th	Lab	CCA*	LCA*	End Term Test	Total
1		Mobile Application Development-II	Core	3	1		2		50		50	100
2		Internet of Things	Core	3	1		2		50		50	100
3		Artificial Intelligence	Core	3	1		2		50		50	100
4		Elective-III	Elective	3	1		2		50		50	100
5		Lab on Mobile Application Development-II	Core			3		2		50	50	100
6		Mini Project	Core			3		2		50	50	100
7	WPC6	Scientific studies of mind, matter, spirit and Consciousness	SEC	3			2		70		30	100
		Total :		15	04	06	10	04	270	100	330	700

Weekly Teaching Hours: 25
Total Credits Trimester IX: 14

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Elective Courses:

Sr. No	Course code	Course Name
1	Elective - I	Data Mining and Warehousing
2		Agile Frameworks
3		Advanced Database Management System
4	Elective - II	Introduction to Data Science
5		Automation Testing-I
6		Database Administration - I
7	Elective - III	Machine Learning
8		Automation Testing II
9		Database Administration - II

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Syllabus

Dr. Vishwanath Karad
MIT- World Peace University

FACULTY OF SCIENCE

Bachelor Of Computer Applications
BCA (Trimester I)

BATCH: 2020-21

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Fundamentals of Computer Science**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

Course Objectives:

Students will be able to:

1. Understand of how a computer works
2. Learn basic concepts of Computer science and applications
3. Prepare for future computer science courses

Course Outcomes:

1. Understanding generation of computers and computer organization
2. Familiarizing with Operating system concepts
3. Understanding types of software's
4. Familiarizing with networking concepts
5. Implementation of basic assemble level language
6. Understanding of all types memory devices

Course Contents:

1. Introduction to computer
2. Computer system hardware
3. Computer Memory
4. Interaction of User & Computer
5. Data Communication & Computer Network

Learning Resources:

Reference Books:

1. Computer Fundamentals, P. K. Sinha
2. Computer Fundamentals, Anita Goel
3. Computer System Architecture, 3e, Mano

Pedagogy:

Participative learning, group discussions, assignments, Tutorials

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Tutorial	Attendance
10	20	10	10

Term End Examination: 50 marks

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Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	Introduction to Computer Introduction, Digital & Analog Computers Characteristics of Computer, History of Computers Generations of Computer Classification of Computers The Computer System, Applications of Computer	6	-	-
2	Computer System Hardware Introduction Central Processing Unit Memory Unit Interconnecting the units of a computer Instructions Format, Set & Cycle	6	-	-
3	Computer Memory Introduction Memory Representation Memory Hierarchy CPU Registers, Cache Memory Primary & Secondary Memory Access Types of Storage Devices Magnetic Tape & Discs, Optical Discs Using Computer Memory	6	-	-
4	Interaction of User & Computer Introduction High Level & Low Level Languages Types of Software System Software Application Software Software Acquisition	6	-	-
5	Data Communication & Computer Network Introduction Importance of Networking Data Transmission Media Data Transmission Across Media Data Transmission & Data Networking Computer Network Wireless Networking	6	-	-

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Programming in C**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

1. Basic knowledge of mathematical and algorithmic logics

Course Objectives:

1. To understand the concepts of "C" Programming.
2. To understand how to use C programming in day to day problem solving.
3. To develop logic reasoning and logic development.

Course Outcomes:

1. Understanding a functional hierarchical code organization.
2. Able to define and manage data structures based on problem subject domain.
3. Able to work with textual information, characters and strings.
4. Able to work with arrays of complex objects.
5. Understanding a concept of object thinking within the framework of functional model.
6. Understanding a concept of functional hierarchical code organization.
7. Understanding a defensive programming concept.
8. Able to handle possible errors during program execution.

Course Contents:

1. Introduction & Language Fundamentals
2. Decision making and loops
3. Arrays in C
4. Functions in C
5. C Pre-processors

Learning Resources:

Reference Books:

1. The C Programming Language, Brian W. Kernighan, Dennis Ritchie
2. Let us C, Yashwant Kanetkar
3. Programming in C, Balguruswamy
4. Structured programming approach using C, Forouzah &Ceilberg, Thomson learning publication

Pedagogy:

1. Participative learning, discussions, algorithm, programming concepts, experiential learning through practical problem solving, assignments, Tutorial

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Presentations	Attendance	Mid Term Exam
10	10	10	20

Term End Examination : 50 marks

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Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**Introduction & Language Fundamentals** Introduction to C, history, Structure of C program Language Fundamentals – keywords, identifiers, character sets, tokens Data types, Variables and constants Qualifiers Operators, types of operators – unary, binary, relational, logical, arithmetic &Bitwise operators Operator precedence & associativity Console based I/O and related built-in I/O functions: printf(), scanf(), getch(), getchar() and basic formatting Type casting	6	-	-
2	**Decision making and loops** Decision Making structure – if statement, it-else statement, Nested if-else statement, conditional operator, switch statements Loop control structures – while loop, do-while loop, for loop, nested loops Jump statements – break, continue, goto, exit	6	-	-
3	**Arrays in C** Introduction to 1-D array, definition, declaration, initialization Accessing and displaying 1-D array elements Introduction to 2-D array, definition, declaration, initialization Accessing and displaying 2-D array elements Multidimensional Arrays.	6	-	-
4	**Functions in C** Introduction – purpose, definition, declaration, main() function Function prototype and calling a function Variables – local and global, scope(local, global, file)and lifetime of a variable Arguments, parameters, formal & actual parameters, Function return type Call by value Arrays and functions Command line arguments Storage classes	6	-	-
5	**C Preprocessors** Definition of preprocessor Macro substitution - #define File inclusion - #include Conditional Compilation - #if, #else, #elif	6	-	-

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Business Communication**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

Course Objectives:

Students will learn to:

1. Identify relevant methods of Communication
2. Explain how business letters and business documents are structured
3. Understand the techniques involved in composing Persuasive communication
4. Understanding new trends in Business

Course Outcomes:

On completion of the course, student will be able to–

1 Develop communication skills for writing effectively, oral presentation and work in teams

2 Use a variety of media for communication that includes new technologies in addition to reading and speaking

3. Improve your overall communication skills for future courses and your career.

Course Contents:

Methods of Communication
Business Letters
Persuasive Communication
Emerging Trends

Learning Resources:

Reference Books:

1. Essentials of Business Communication, Sixth Edition, Mary Ellen Guffey, South-Western College Publishing
2. Business communication essentials: a skills-based approach, Boston Pearson, Print book, 7th edition

Pedagogy:

Participative learning, problem solving, assignments, Tutorial

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignment	Mid Term Exam	Tutorial	Attendance
10	20	10	10

Term End Examination : 50 marks

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Programme Head	HOS/BOS Chairman	Associate Dean
BCA	School of Computer Science	MIT-WPU

Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**Methods of Communication** Letters, Memos ,Fax, Email, Multimedia, Key stages in the communication cycle, Systems, Ten tips for successful communication, verbal and non-verbal communication, Interview related communication	8	-	-
2	**Business Letters** Rules of good writing, Use of right tone, formats, Employment correspondence(Application letter, C.V, Letter of acceptance, Letter of recommendation), Internal communication -Types of Meetings, Notice and Agenda	8	-	-
3	**Persuasive Communication** Sales letters, , Invitations –formal and informal , Press releases, Publicity materials, Designing of leaflets	7	-	-
4	**Emerging Trends** New trends in business communication, customer Relations, Aid to correct writing	7	-	-

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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Introduction to Digital Electronics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

Course Objectives:

1. To get familiar with concepts of digital electronics
2. To learn number systems and their representation
3. To understand basic logic gates, Boolean algebra and K-maps
4. To study arithmetic circuits, combinational circuits and sequential circuits

Course Outcomes:

1. Realize and simplify Boolean Algebraic assignments for designing digital circuits using KMaps
2. Design and implement Sequential and Combinational digital circuits as per the specifications

Course Contents:

1. Digital Logic Circuits
2. Boolean Algebra
3. Combinational Circuits
4. Sequential Circuits

Learning Resources:

Reference Books:

1. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education
2. Digital Electronics: Jain R.P., Tata McGraw Hill
3. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill
4. M.Morris Mano, " Digital Design " 3rd Edition, PHI, NewDelhi.
5. Ronald J. Tocci. "Digital Systems-Principles and Applications" 6/e. PHI. New Delhi. 1999.(UNITS I to IV)

Pedagogy:

Participative learning, discussions, problem solving, assignments, Tutorial

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Attendance	Tutorial
10	20	10	10

Term End Examination : 50 marks

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BCA	School of Computer Science	MIT-WPU

Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**Number Systems and Digital codes** Introduction to Decimal, Binary and Hexadecimal number systems and their inter-conversions, binary addition and binary subtraction using 2's complement, Binary Coded Decimal number, Gray Codes, Gray to Binary and Binary to Gray conversion, Alphanumeric representation in ASCII codes.	8	-	-
2	**Logic gates and Boolean algebra** Logic gates (NOT, AND, OR, NAND, NOR, XOR gate) with their symbol, Boolean equation and truth table. Rules and laws of Boolean algebra, De Morgan's theorem, simplification of Logic equations using Boolean algebra rules, Min terms, Max terms, Boolean expression in SOP and POS form, Introduction to Karnaugh Map, problems based on SOP (upto 3 variables), digital designing using K Map for: Gray to Binary and Binary to Gray conversion(3 bit)	8	-	-
3	**Combinational Circuits** Half adder, Full adder, Half subtractor, Parallel adder, study of Multiplexer (4:1) and Demultiplexer (1:4),Encoder (Decimal to BCD encoder and 3 bit priority encoder), Decoder(3 to 8 line decoder using gates only).	8	-	-
4	**Sequential circuits** Difference between combinational and Sequential circuits,RS Flip Flop using NAND gate, D Flip Flop, J K Flip ,T Flop Flip Flop, Types of Shift Register, Counters : Types of Counters, Design of 3 bit Asynchronous counter, Design of 3 bit synchronous counter.	6	-	-
	Tutorials: 1. Write a C Program for Decimal to Binary Conversion. 2. Solve Z= ∑A, B,C(1,3,6,7) using KMAP. 3. Construct Full adder using Half Adder. 4. Design 4:1 multiplexer using 2:1 multiplexer. 5. Design synchronous counter for sequence: 0 → 1 → 3 → 4 → 5 → 7 → 0, using T flip-flop.			

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Syllabus

Dr. Vishwanath Karad
MIT- World Peace University

FACULTY OF SCIENCE

Bachelor of Computer Applications
BCA (Trimester II)

BATCH: 2020-21

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Advanced C**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites: Basic concepts of C.

Course Objectives:

1. To familiarize the trainee with advanced concepts of computer programming and C environment
2. To Introduce different techniques pertaining problem solving skills.
3. To emphasis on guided practical sessions.

Course Outcomes:

1. Understanding of more advanced features of the C language
2. Exercise File concept to show input and output of files in C
3. Inscribe C Programs that uses Pointer to access arrays, strings and Functions.
4. Inscribe C Programs using pointers using dynamic memory allocation functions.
5. Exercise Derived data types including structures and unions to solve problems.

Course Contents:

1. File Handling in C
2. Pointer & Memory Management
3. Strings
4. Structures
5. Unions

Learning Resources:

Reference Books:

1. The C Programming Language, Brian W. Kernighan, Dennis Ritchie
2. Programming in C – A Practical Approach, Ajay Mittal (Pearson Publications)
3. Programming with C, Byron S Gottfried (Schaum's Outlines)
4. A structural Programming Approach using C, BehrouzForouzan& Richard Gilberg

Pedagogy:

Participative learning, assignments, Tutorial, programming, lab assignments

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Mid Term Exam	Presentations	Attendance	Tutorial
20	10	10	10

Term End Examination : 50 marks

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Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**File Handling in C** 1.1 Introduction – defining files 1.2 Creating files & types of files 1.3 File opening modes 1.4 Input & output operations on files using standard library 1.5 Copying ad appending files 1.6 Reading & Writing binary files Random access files – fseek, ftell, rewind	6	-	-
2	**Pointer & Memory Management** 2.1 Concept – reference & dereference (Data model – Value model v/s Reference model 2.2 Declarations, definitions, initializations & use 2.3 Types of Pointers 2.4 Pointer arithmetics 2.5 DMA – allocation (malloc, calloc, realloc), resizing, releasing (free), memory leak, dangling pointers 2.6 Heap Memory, Stack Memory – Pitfalls 2.7 Array & Pointers – pointer to array & array of pointers 2.8 Functions & pointers – pass by reference, passing pointer to functions, returning pointer from a function, function pointer and pointer to function 2.9 Pointer to pointer	6	-	-
3	**Strings** 3.1 Concept 3.2 Declaration, definition, initialization, format specifiers 3.3 String literals/ constants & variables – reading & writing from & to console 3.4 Importance of terminating NULL character 3.5 Strings & pointers 3.6 Array of strings & array of character pointers 3.7 String library functions 3.8 Implementations without standard library functions.	6	-	-
4	**Structures** 4.1 Concept 4.2 Declaration, definition, initialization, accessing structure members (. operator) 4.3 Array of structures	6	-	-

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	4.4 Pointers to structures - declaring pointer to structure, accessing structure members via pointer to structure (-> operator) 4.5 Structures & functions - passing each member of structure as a separate argument, passing structure by value / address 4.6 Nested structures typedef & structures			
5	**Unions** 5.1 Concept 5.2 Declaration, definition, accessing union members Difference between Structures & unions	6	-	-

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Database Management System**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites: Basic knowledge of computers

Course Objectives:

1. To introduce data processing using computers.
2. To explain data models used for database design
3. To understand creations, manipulation and querying of data in databases

Course Outcomes:

1. Understanding necessity of database to store data
2. To do analysis of system and create conceptual model and design database schema
3. To write queries using relational algebra operators for querying data from database
4. To use DDL and DML commands of SQL for the creation, manipulation of data in databases
5. To write SQL statements for querying data from database
6. Inscribe C Programs using pointers using dynamic memory allocation functions.

Course Contents:

1. Database Management System
2. Entity-Relationship Model
3. Relational Model
4. SQL (Structured Query Language)
5. Advanced Queries using SQL

Learning Resources:

Reference Books:

1. Database System Concepts, Henry korth and A. Silberschatz
2. An Introduction to Database System, Bipin Desai
3. File Structure by Michael, J. Folk, Greg, Riccardi
4. Teach Yourself SQL in 14 days, Jeff Parkins and Bryan Morgan

Pedagogy:

Participative learning, discussions, problem solving, assignments, Tutorials, Lab assignments

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term exam	Presentation	Attendance
10	20	10	10

Term End Examination : 50 marks

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Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**Database Management System** Drawbacks of using files to store data Purpose of database systems Definition of DBMS Comparison of File processing system & DBMS Limitation of file processing system Advantages and Disadvantages of DBMS Users of DBMS Overall system structure	5	-	-
2	**Entity-Relationship Model** Entities and Entity Sets Relationships and Relationships Sets Attributes Mapping cardinalities Entity Relationship Diagram	5	-	-
3	**Relational Model** Structure of relational database Terms - Relation, Tuple, Attribute, Cardinality Keys - Super Key , Candidate Key, Primary Key, Foreign Key Conversion of ER Diagram to Relational Model Conversion of relational schema to 3NF Relational Algebra Operations - Select, Project, Union, Difference, Intersection, Cartesian Product, Natural Join	7	-	-
4	**SQL (Structured Query Language)** Introduction, history Of SQL Definition basics structure of SQL DDL Commands: CREATE,DROP,ALTER Data types and constraints DML Command: INSERT,UPDATE,DELETE,SELECT Simple queries	8	-	-
5	**Advanced Queries using SQL** Aggregate function Set operations Order by, Group by, Having clauses SQL mechanisms for joining relations (inner joins, outer joins and their types) Nested queries	5	-	-

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Discrete Mathematics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

1. Basic Knowledge of Mathematics

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by

1. Using mathematically correct terminology and notation.
2. Constructing correct direct and indirect proofs.
3. Applying logical reasoning to solve a variety of problems.

Course Outcomes:

Students will be able to:

1. Demonstrate the ability to write and evaluate a proof or outline the basic structure
2. Understand the basic principles of sets and operations on sets.
3. Analyze basic set equalities.
4. Apply counting principles to determine probabilities.
5. Demonstrate an understanding of relations and functions and be able to determine their properties.
6. Demonstrate different traversal methods for trees and graphs.
7. Model problems in Computer Science using graphs and trees.

Course Contents:

1. Set Theory & Logic
2. Combinatorics and Discrete Probability
3. Relations & Functions
4. Graph
5. Tree

Learning Resources:

Reference Books:

1. Discrete Mathematical Structures: Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Nadeen-Ur-Rehman.
2. Discrete Mathematics And Its Applications: Rosen
3. Graph Theory with Applications to Engineering and Computer Science, Deo, Narsing

Pedagogy:

Participative learning, discussions, algorithm, programming concepts, experiential learning through practical problem solving, assignments

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Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Tutorial	Attendance
10	20	10	10

Term End Examination : 50 marks

Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**Set Theory & Logic** Sets, Subsets, Operations on Sets, De Morgan's Laws Power Set of a Set, Cartesian Product, Equivalence relation, Partition of a Set, Partial order on a set	6	-	-
2	**Combinatorics and Discrete Probability** Permutations & Combinations – Rule of sum and product, permutations, combinations, Algorithms for generation of permutations. Discrete Probability, Conditional Probability, Information and Mutual Information, Binomial Coefficients and combinatorial Identities	6	-	-
3	**Relations and Functions** Definitions, Properties of Binary Relations, Equivalence Relations and Partitions, Partial Ordering Relations and lattices, Chains and Anti-chains Definitions, Domain, Range, One-To-One and On-To, Inverse and Composition, Pigeonhole Principle, Discrete Numeric Functions and Gathering Functions, Job Scheduling Problems	6	-	-
4	**Graphs** Definition and examples of graphs, Incidence and degree Sub-graphs, Walks, Path, Circuits, Connected and disconnected graphs, Euler graphs Operations on graphs. Hamiltonian Graphs, Traveling Salesman problem Algorithms: Connectedness algorithm, Shortest Path Algorithm Product of two graphs, Complement of a graph, Self Complement of a graph	6	-	-
5	**Trees** Definition and properties of trees, Pendent vertices, centre of a tree, Rooted and binary tree Spanning trees, minimum spanning tree algorithms Fundamental circuits, cutsets and cut vertices, fundamental cutsets Connectivity and separativity, max-flow min-cut theorem	6		

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Computer Organization and Introduction to Microprocessor**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

Course Objectives:

1. To understand the design of the various functional units and components of digital computers.
2. To explain the function of each element of a memory hierarchy, identify and compare different methods for computer I/O.
3. To understand the structure, function and characteristics of Microprocessor

Course Outcomes:

On completion of the course, student will be able to :

1. Demonstrate computer organization concepts related to design of modern processors, memories and I/Os.
2. Analyze the performance of commercially available computers.
3. Develop logic for assembly language programming
4. Understand the components of Microprocessor
5. Understand computer organization concepts and structure.

Course Contents:

Computer Structures
Internal Memory
Input/output
Introduction to microprocessor

Learning Resources:

Reference Books:

1. Computer System Architecture: Morris Mano, Prentice-Hall.
2. Computer Organization and architecture (6th Edition): William Stalling, Prentice-Hall.
3. Microprocessor and Interfacing Programming and Hardware: Douglas Hall, Tata McGraw Hill
4. Computer Architecture and Organization by John P Hayes, Tata McGraw Hill.

Supplementary Reading:

1. A. Tannenbaum, "Structured Computer Organization", Pearson Education, 2002.
2. Patterson & Hennessy, "Computer Organization and Design", Morgan Kaufmann, 2007
3. Ramesh S. Gaonkar, "Microprocessor, Architecture, Programming, and Applications with the 8085", Penram International Publication.

Pedagogy:

Participative learning, discussions, problem solving, assignments, tutorial

Assessment Scheme:

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Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Presentations	Attendance
10	20	10	10

Term End Examination : 50 marks External

Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**CPU Organization:** Concept of Address Bus, Data Bus, Control Bus. CPU Block Diagram and Explanation of each block, Register based CPU organization, Concept of Stack & its organization, Block Diagram of ALU	**6**	**-**	**-**
2	**Memory Organization** : Memory Architecture, Memory hierarchy, Types of Memories, Data Read/ Write process, Role of Cache memory, Virtual Memory.	**8**	**-**	**-**
3	**I/O Interfaces** Block dig. of I/O interface, Serial communication interfaces, Asynchronous communication and synchronous communication, Parallel communication, DMA controller.	**8**	**-**	**-**
4	**Introduction to Microprocessor.** Introduction to 8086 microprocessor, Real mode & protected mode, Processor Register, Addressing modes and opcode concept, Interrupts, Bus formats and operation, Construction of instruction word and instruction cycle and execute cycle. Concept of parallelism, parallel computer structures, concept of pipeline, instruction pipeline. Concept of RISC and CISC. Concept of Algorithms and Flowcharts (Definitions, Symbols, Characteristics)	**8**	**-**	**-**
	Tutorial: 1. What is Virtual Memory? Explain Virtual memory organization. 2. What is Parallel Processing? Explain Instruction Pipelining method of parallel processing. 3. Explain Register organization of CPU. 4. Draw and Explain functional Block diagram of 8086 Microprocessor 5. Explain block diagram of ALU. 6. Explain function table for 2 bit data.			

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FACULTY OF SCIENCE

Bachelor of Computer Applications
BCA (Trimester III)

BATCH: 2020-21

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Data Structures using C**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

1. Knowledge of Arrays, Structure and Functions

Course Objectives:

1. To introduce the fundamental concept of data structures
2. To emphasize the importance of data structures in developing and implementing efficient algorithms. In addition,
3. To develop effective software engineering practice, emphasizing such principles as decomposition, Procedural abstraction and software reuse.

Course Outcomes:

After completing this course, a student will be able to:

1. Describe how arrays, records, linked structures, stacks, queues, trees, are represented in memory and used by algorithms
2. Describe common applications for arrays, records, linked structures, stacks, queues, and trees
3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees
5. Compare alternative implementations of data structures with respect to performance
6. Compare and contrast the benefits of dynamic and static data structures implementations
7. Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack
8. Design and implement an appropriate hashing function for an application

Course Contents:

1. Introduction to Data Structures
2. Stack and Queue
3. Linked List
4. Trees

Learning Resources:

Reference Books:

Fundamentals of Data Structures, . Horowitz and S. Sahani
Introduction to Data Structures in C, Ashok N. Kamthane
Data Structure Using C, Radhakrishanan and Shrivastav
Data Structure Using C, Bandopadhyay & Dey(Pearson)

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Pedagogy:
Participative learning, discussions, assignments, tutorials, programming assignment

Assessment Scheme:
Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Attendance	Tutorial
10	20	10	10

Term End Examination : 50 marks

Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	Introduction to Data Structures 1.1 Self –referential structure 1.2 Data Structures 1.3 Primitive and Non-Primitive Data Structures 1.4 Linear and Non-linear Structures. 1.5 Linear Lists	4	-	-
2	Stack and Queue 2.1 Stack-Static and Dynamic Representation, Operation, Application of Stack, Evaluation of postfix expression, Infix to postfix 2.2 Queue -Static and Dynamic Representation, Operation, Priority Queue, Circular Queue (Implementation) 2.3 Application of Queue	8	-	-
3	Linked List 3.1 Representation –Static & Dynamic 3.2 Singly Linked List Creation, Insertion (Begin, Middle, End), Printing, deleting (Begin, Middle, End) Traversing. 3.3 Doubly Linked list (Creation, Deletion) 3.4 Circularly Singly Linked list (Creation, Deletion)	8	-	-
4	Trees 4.1 Definition 4.2 Terminology 4.3 Representation 4.4 Binary tree 4.5 Representation(Both) 4.6 Binary Tree Traversal Inorder, Preorder, Postorder 4.7 Binary Search Tree (Implementation) 4.8 Heap 4.9 AVL / Height Balanced tree	10	-	-

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Relational Database Management System**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites: Basic knowledge of database management system

Course Objectives:

1. To understand use of stored functions, cursors, views and triggers to interact with databases
2. To introduce design of relational database
3. To introduce concepts of database transactions and their concurrent execution
4. To introduce techniques for recovering data back after system failure

Course Outcomes:

1. To write stored functions, cursors, views and triggers to interact with databases
2. To normalize the database in different normal forms
3. To derive primary keys for relations by applying algorithm
4. To analyze transactions and prepare concurrent schedules
5. To solve problems related to data recovery after system failure

Course Contents:

1. Advanced SQL
2. Relational Database Design
3. Transactions
4. Crash Recovery

Learning Resources:

Reference Books:

1. Database System Concepts, Henry korth and A. Silberschatz
2. An Introduction to Database System, Bipin Desai
3. File Structure by Michael, J. Folk, Greg, Riccardi
4. Teach Yourself SQL in 14 days, Jeff Parkins and Bryan Morgan

Pedagogy:

Participative learning, discussions, problem solving, assignments, tutorial

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Attendance	Tutorial
10	20	10	10

Term End Examination: 50 marks

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Associate Dean
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Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**Advanced SQL** Controlling the program flow, conditional statements, loops Views, Stored Functions Handling errors and exceptions Cursors, Triggers	9	-	-
2	**Relational Database Design** Pitfalls in Relational-Database Functional dependencies Closure of Functional dependencies (F+) Closure of an Attribute set Algorithm to derive a Primary Key for a relation and examples Concept of Decomposition Desirable Properties of Decomposition 7.5 Concept of Normalization Normal forms : 1NF, 2NF, 3NF, BCNF	8	-	-
3	**Transactions and concurrency control mechanism** Describe a transaction, properties of transaction, state of the transaction. Executing transactions concurrently associated problem in concurrent execution. Schedules types of schedules concept of Serializability, Precedence graph for Serializability. Ensuring Serializability by locks, different lock modes, 2PL and its variations. Basic timestamp method for concurrency, Thomas Write Rule. Locks with multiple granularity, dynamic database concurrency (Phantom Problem). Timestamps versus locking. Deadlock handling methods Detection and Recovery (Wait for graph). Prevention algorithms (Wound-wait, Wait-die)	9	-	-
4	**Crash Recovery** Failure classification Recovery concepts Log base recovery techniques (Deferred and Immediate update) Checkpoints Recovery with concurrent transactions (Rollback, checkpoints, commit) Database backup and recovery from catastrophic failure. Shadow paging	4	-	-

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COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Calculus & Matrices**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites:

Course Objectives:

1. To understand the relationship between the derivative and the definite integral as expressed in both parts of the Fundamental Theorem of Calculus
2. To formulize the problems using matrices.

Course Outcomes:

1. Describe the concepts and applications of derivatives and higher order derivatives
2. Understand the ideas of derivatives and higher order derivatives
3. Acquire the concept of finding partial derivatives and associated rules
4. Develop competency in applying the idea of partial derivatives

Course Contents:

1. Matrices
2. Differential calculus
3. Differential equations
4. Integral calculus

Learning Resources:

Reference Books:

1. A Textbook of Matrices, Shanti Narayan, 7th Edition, S. Chand and Co. Publication
2. Differential Calculus , Shanti Narayan, 7th Edition, S. Chand and Co. Publication
3. Intergral Calculus , Shanti Narayan, 7th Edition, S. Chand and Co. Publication
4. A Textbook of Business Mathematics , Dr. Padmalochan Hazarika, S. Chan

Pedagogy:

Participative learning, discussions, algorithm, programming concepts, experiential learning through practical problem solving, assignments

Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Attendance	Tutorial
10	20	10	10

Term End Examination : 50 marks

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Programme Head	HOS/BOS Chairman	Associate Dean
BCA	School of Computer Science	MIT-WPU

Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	MATRICES 1.1 Definition, Types of Matrices 1.2 Rank of a Matrix. Condition for consistency, Nature of the general solution. System of linear homogeneous equations, Gauss elimination Method 1.6 System of linear non-homogeneous equations. 1.3 Eigen values, Eigen vectors and the characteristic equation of a matrix. 1.4 Cayley Hamilton theorem and its use in finding inverse of a matrix.	8	-	-
2	DIFFERENTIAL CALCULUS 2.1 Differentiability 2.2 Derivatives of Composite functions and Chain Rule 2.3 Derivatives of Inverse Trigonometric functions 2.4 Exponential and logarithmic functions 2.5 Logarithmic differentiation 2.6 Second Order Derivative	8	-	-
3	DIFFERENTIAL EQUATIONS 4.1 Basic concepts like order and degree of Differential Equations 4.2 General and Particular Solution of a Differential Equation 4.3 Formation of a Differential Equation whose general solution is given 4.4 Method for solving first order and first degree Differential Equation.	7	-	-
4	INTEGRAL CALCULUS 3.1 Methods of Integration 3.2 Integration by parts 3.3 Definite Integral 3.4 Integration by Substitution 3.5 Integrating with inverse trigonometric functions	7	-	-

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MIT WORLD PEACE UNIVERSITY | PUNE
TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

COURSE STRUCTURE

Course Code				
Course Category	**Core**			
Course Title	**Software Engineering**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs.	**3**	**1**	**--**	**2**

Pre-requisites: Basic knowledge of computer system.

Course Objectives:

1. To introduce basics of System Analysis and Design.
2. To develop broad understanding of the discipline of software engineering
3. To explain importance and working of process models used in software development process
4. To introduce an agile environment for software development.

Course Outcomes:

1. To the analysis and design of complex systems
2. To apply software engineering principles and techniques
3. To develop, maintain and evaluate large-scale software systems
4. To produce efficient, reliable, robust and cost-effective software solutions
5. To work as an effective member or leader of software engineering teams
6. To understand and meet ethical standards and legal responsibilities

Learning Process:

Reference Books

1. Software Engineering Fundamentals, Oxford Indian Reprint, 2012, Ali Behforroz, Frederick J. Hudson
2. Software Engineering Concepts, Richard Fairley, Tata McGraw Hill Edition, 2008.
3. Fundamentals of Software Engineering, Rajib Mall, PHI Learning Pvt. Ltd. 2009
4. System Analysis and Design: Ellias M. Awad (Galgotia)
5. Software Engineering–A Practitioner's Approach (7th Ed): Roger S. Pressman (Mc-Graw Hill)
6. Analysis and Design of Information Systems: James A. Senn (McGraw Hill)

Pedagogy:

Participative learning, Case study

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Assessment Scheme:

Class Continuous Assessment (CCA) 50 marks

Assignments	Mid Term Exam	Attendance	Case Study
10	20	10	10

Syllabus:

Module	Contents	Work load in hrs.		
		Theory	Lab	Access
1	**System Concepts** System Definition Characteristics of a System : Organization, Subsystem, Interaction, Interdependence, Integration, Central objective, Standards, Black-box Elements of a system Outputs, Inputs, Processor(s), Control, Feedback, Environment, Boundaries, Interface Physical & Abstract Systems Open & Closed Systems, Computer-based Systems : MIS ,DSS	5	-	-
2	**Software and Software Engineering** The Nature of Software Defining Software Software Application Domains Legacy Software Software Engineering, Software Engineering Practice The Software Process The Essence of Practice General Principles, Software Myths	8	-	-
3	**System Development Life Cycle (SDLC)** Introduction Activities of SDLC Preliminary Investigation Determination of System Requirements Design of System Development of Software System Testing (Unit Testing, Integration testing, System Testing) System Implementation & Evaluation System Maintenance	8	-	-
4	**Process Models** A Generic Process Model Prescriptive Process Models: The Waterfall, Incremental model Evolutionary Process Models: Prototyping, Spiral Model	4	-	-

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	Concurrent Models			
5	**An Agile View of Process** What is an Agility? What is an Agile Process? The Politics of Agile Development Human Factors Agile Process Models: Extreme Programming, Adaptive Software Development, Dynamic Systems Development Method	5		

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