SYLLABUS

DR VISHWANATH KARAD
MIT - WORLD PEACE UNIVERSITY

FACULTY OF SCIENCE

B.SC. COMPUTER SCIENCE

BATCH – 2018-19

Prof. Neeta Kankane
Associate Dean

PROGRAMME STRUCTURE

Preamble:

B. Sc. Computer Science is three year fulltime programme. It is based on trimester pattern and choice based credit based system, it prepares the student for a future prospectus in IT Industry. The syllabus of computer Science subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) forms the required basics for pursuing higher studies in Computer Science

At first year a course in programming and a course in database fundamentals forms the preliminary skill set helps to solve computational problems. One practical courses in computer science per trimester is designed including the programming and database fundamentals to supplement the theoretical training. Along with Computer Science courses basic science courses are included i.e Electronics, Mathematics & Statistics theory and practical to help in building a strong foundation.

At second year computer and programming skills are further strengthened by a course in web development, Data Structure, and Object oriented programming. Two practical courses in computer science per trimester is designed including the concepts of Data Structure, Object oriented programming and Web Development. Simultaneously along with Computer Science courses basic science courses are included i.e Electronics and Mathematics theory and practical

At third year for each trimester Five courses of computer science and two practical ore offered. In each trimester student can chose the two elective courses in computer science from the pool of electives courses. Practical course also includes project work which gives students hands on experience in solving a real world problem.

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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

- To develop problem solving abilities using a computer
- To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems.
- To imbibe quality software development practices. To create awareness about process and product standards
- To train students in professional skills related to Software Industry.
- To prepare necessary knowledge base for research and development in Computer Science
- To help students build-up a successful career in Computer Science

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Programme Specific Outcomes

- 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.
- B.Sc. (Computer Science) graduates can go for higher study in programmes like Master of Computer Application, M.Sc. in Computer Science, M.Sc. in Statistics, M.Sc. in Operation Research and M.Sc. in IT etc.

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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 – 52

Second Year – 60

Third Year - 44

(ii) Total in the programme - 156

(d) Assessment Criteria:

For second Year- A student is allowed to take admission in Second Year, if he/she has a backlog of not more than six papers and three practicals of total number of First Year Examination.

For Third Year- A student is allowed to take admission in Third Year, if he/she has a backlog of not more than six papers and three practicals of total number of Second Year Examination papers.

(e) Medium of Instruction and Examination: English

(f) Eligibility criteria for admission to the programme:

1. HSC (Science) with Mathematics subjects **OR** Three years Diploma of Board of Technical Education or its equivalent
2. Entrance Examination / Personal Interview conducted by University.

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B.Sc. Computer Science
2018-19

A. Definition of Credit:-

3 Hr. Lecture / Tutorial per week	2 credit
2 Hours Practical(Lab) per week	1 credit

B. Credits:-

Total number of credits for three year undergraduate B.Sc. Programme would be 156.

C. Structure of Credits for Undergraduate B.Sc. Program:-

S. No.	Category	Suggested Breakup of Credits(Total 156)
1	Humanities and Social Sciences and Peace Programmes including Management courses	10
2	Basic Science courses including laboratory	54
3	Professional core courses including Laboratory/Mini Project Work	72
4	Professional Elective courses	14
5	AECC Courses	6
	Total	**156**

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D. Course code and definition:-

Course code	Definitions
L	Lecture
T	Tutorial
WP	Humanities and Social Sciences and Peace Programs
SEC	Skill Enhancement Courses
AECC	Ability Enhancement Compulsory Courses
MOOC	Massive Open Online Courses
OEC	Open Elective Courses
BCS	B.Sc.(Computer Science)
MS	M.Sc.(Computer Science)

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. Sc. Computer Science (First Year) (Batch 2018-19)

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	MIT-WPU-BCS1101	Introduction to Programming & Basic Programming using C	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS1102	Fundamentals of Database	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS1103	Fundamentals of Mathematics	Core	2	1	-	2	-	50	-	50	100
4	MIT-WPU-BCS1104	Basic Statistics	Core	3	-	-	2	-	50	-	50	100
5	MIT-WPU-BCS1105	Principles of Analog Electronics	Core	3	-	-	2	-	50	-	50	100
6	MIT-WPU-BCS1106	Lab course on Computer – I & II	Core	-	-	2	-	2	-	50	50	100
7	MIT-WPU-BCS1107	Lab course on Statistics	Core	-	-	3	-	2	-	25	25	50
8	MIT-WPU-BCS1108	Lab course on Electronics	Core	-	-	3	-	2	-	25	25	50
9	WPC 1	Philosophers of Bharat, Great Kings/Dynasties	SEC	2	-	2	2	-	50	-	50	100
		Total :	-	16	01	10	12	06	300	100	400	800

Type: Core

****Assessment Marks are valid only if Attendance criteria are met**

Weekly Teaching Hours: 27

Total Credits: First Year B.Sc. Computer Science Trimester I: 18

*CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

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B. Sc. Computer Science (First Year) (Batch 2018-19)

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	MIT-WPU-BCS1201	Modular Programming using C	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS1202	Relational Database Management System	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS1203	Graph Theory	Core	2	1	-	2	-	50	-	50	100
4	MIT-WPU-BCS1204	Probability Theory	Core	3	-	-	2	-	50	-	50	100
5	MIT-WPU-BCS1205	Principles of Digital Electronics	Core	3	-	-	2	-	50	-	50	100
6	MIT-WPU-BCS1206	Lab course on Computer – I & II	Core	-	-	2	-	2	-	50	50	100
7	MIT-WPU-BCS1207	Lab course on Statistics	Core	-	-	3	-	2	-	25	25	50
8	MIT-WPU-BCS1208	Lab course on Electronics	Core	-	-	3	-	2	-	25	25	50
		Total :	-	14	01	08	10	06	250	100	350	700

Type: Core

Weekly Teaching Hours: 23

Total Credits: First Year B.Sc. Computer Science Trimester II: 16

****Assessment Marks are valid only if Attendance criteria are met**

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B. Sc. Computer Science (First Year) (Batch 2018-19)

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	MIT-WPU-BCS1301	Advanced Programming Using C	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS1302	System analysis and design	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS1303	Number Theory & Calculus	Core	2	1	-	2	-	50	-	50	100
4	MIT-WPU-BCS1304	Correlation, Regression & Analysis	Core	3	-	-	2	-	50	-	50	100
5	MIT-WPU-BCS1305	Advanced Digital Electronics	Core	3	-	-	2	-	50	-	50	100
6	MIT-WPU-BCS1306	Lab course on Computer – I & II	Core	-	-	2	-	2	-	50	50	100
7	MIT-WPU-BCS1307	Lab course on Statistics	Core	-	-	3	-	2	-	25	25	50
8	MIT-WPU-BCS1308	Lab course on Electronics	Core	-	-	3	-	2	-	25	25	50
9	WPC 2	Gandhian Philosophy	SEC	2	-	2	2	-	50	-	50	100
		Total :	-	16	1	10	12	6	300	100	400	800

Type: Core

****Assessment Marks are valid only if Attendance criteria are met**

Weekly Teaching Hours: 27

Total Credits: First Year B.Sc. Computer Science Trimester III: 18

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Total First Year B.Sc. Computer Science Credits: 52

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B. Sc. Computer Science (Second Year) (Batch 2018-19)

Trimester – IV

Type: Core

****Assessment Marks are valid only if Attendance criteria are met**

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	MIT-WPU-BCS2101	Web Development	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS2102	Object Oriented Software Engineering	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS2103	Algebra & Cryptography	Core	2	1	-	2	-	50	-	50	100
4	MIT-WPU-BCS2104	Microprocessor Architecture & Programming	Core	3	-	-	2	-	50	-	50	100
5	MIT-WPU-BCS2105	Lab course on Web Development	Core	-	-	2	-	2	-	50	50	100
6	MIT-WPU-BCS2106	Lab course on Object Oriented Software Engineering	Core	-	-	2	-	2	-	50	50	100
7	MIT-WPU-BCS2107	Lab course on Mathematics	Core	-	-	3	-	2	-	25	25	50
8	MIT-WPU-BCS2108	Lab course on Electronics	Core	-	-	3	-	2	-	25	25	50
9	MIT-WPU-BCS2109	English Communication	AECC	3	-		2	-	50	-	50	100
		Total :	-	14	01	10	10	8	250	150	400	800

Weekly Teaching Hours: 25

*CCA: Class Continuous Assessment

Total Credits: Second Year B.Sc. Computer Science Trimester I: 18

*LCA: Laboratory Continuous Assessment

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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	MIT-WPU-BCS2201	Data Structure - I	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS2202	Object Oriented Programming using CPP I	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS2203	Numerical Techniques	Core	3	1	-	2	-	50	-	50	100
4	MIT-WPU-BCS2204	Introduction to Microcontroller & Communication	Core	3	-	-	2	-	50	-	50	100
5	MIT-WPU-BCS2205	Lab course on DS - I	Core	-	-	2	-	2	-	50	50	100
6	MIT-WPU-BCS2206	Lab course on CPP - I	Core	-	-	2	-	2	-	50	50	100
7	MIT-WPU-BCS2207	Lab course on Mathematics	Core	-	-	3	-	2	-	25	25	50
8	MIT-WPU-BCS2208	Lab course on Electronics	Core	-	-	3	-	2	-	25	25	50
9	MIT-WPU-BCS2209	English Communication	AECC	3	-		2	-	50	-	50	100
10	WPC 3	Spirit and Mind, Saints of India and Their Teachings	SEC	2	-	2	2	-	50	-	50	100
		Total :	-	17	01	12	12	8	300	150	450	900

Type: Core

Weekly Teaching Hours: 30

Total Credits: Second Year B.Sc. Computer Science Trimester II: 20

****Assessment Marks are valid only if Attendance criteria are met**

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*LCA: Laboratory Continuous Assessment

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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	MIT-WPU-BCS2301	Data Structures - II	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS2302	Object Oriented Programming using CPP -II	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS2303	Computational Geometry	Core	2	1	-	2	-	50	-	50	100
4	MIT-WPU-BCS2304	Computer Organization	Core	3	-	-	2	-	50	-	50	100
5	MIT-WPU-BCS2305	Lab course on Computer – I	Core	-	-	2	-	2	-	50	50	100
6	MIT-WPU-BCS2306	Lab course on Computer –II	Core	-	-	2	-	2	-	50	50	100
7	MIT-WPU-BCS2307	Lab course on Mathematics Geometry	Core	-	-	3	-	2	-	25	25	50
8	MIT-WPU-BCS2308	Lab course on Electronics	Core	-	-	3	-	2	-	25	25	50
9	MIT-WPU-BCS2309	Environmental Science	AECC	3	-	-	2	-	50	-	50	100
10	MIT-WPU-BCS2310	MOOC - I	Elective	-	3	-	-	2	-	50	50	100
		Total :	-	14	04	10	10	10	250	200	450	900

Type: Core/Elective

Weekly Teaching Hours: 28

Total Credits: Second Year B.Sc. Computer Science Trimester III: 20

Total Second Year B.Sc. Computer Science Credits: 58

****Assessment Marks are valid only if Attendance criteria are met**

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B. Sc. Computer Science (Third Year) (Batch 2018-19)

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	MIT-WPU-BCS3101	Operating System	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS3102	Programming in JAVA-I	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS3103	Internet Programming using PHP-I	Core	3	-	-	2	-	50	-	50	100
4	MIT-WPU-BCS3104	Lab Course - I (JAVA-I)	Core	-	-	2	-	2	-	50	50	100
5	MIT-WPU-BCS3105	Lab Course - II (PHP-I)	Core	-	-	2	-	2	-	50	50	100
6	MIT-WPU-BCS3106	Elective - I	Elective	3	-	-	2	-	50	-	50	100
7	MIT-WPU-BCS3107	Elective - II	Elective	3	-	-	2	-	50	-	50	100
8	WPC 4	Indian Culture and Heritage	SEC	2	-	-	2	-	50	-	50	100
		Total :	-	17	-	04	12	04	300	100	400	800

Type: Core/Elective

Weekly Teaching Hours: 21

Total Credits: Third Year B.Sc. Computer Science Trimester I: 16

****Assessment Marks are valid only if Attendance criteria are met**

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*LCA: Laboratory Continuous Assessment

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B. Sc. Computer Science (Third Year) (Batch 2018-19)

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	MIT-WPU-BCS3201	Theoretical Computer Science	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS3202	Programming in JAVA-II	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS3203	Internet Programming using PHP-II	Core	3	-	-	2	-	50	-	50	100
4	MIT-WPU-BCS3204	Lab Course - I (JAVA-II)	Core	-	-	2	-	2	-	50	50	100
5	MIT-WPU-BCS3205	Lab Course - II (PHP-II)	Core	-	-	2	-	2	-	50	50	100
6	MIT-WPU-BCS3206	Elective - III	Elective	3	-	-	2	-	50	-	50	100
7	MIT-WPU-BCS3207	MOOC - II	Elective	-	3	-	-	2	-	50	50	100
		Total :	-	12	03	04	08	06	200	150	350	700

Type: Core/Elective

Weekly Teaching Hours: 19

Total Credits: Third Year B.Sc. Computer Science Trimester II: 14

****Assessment Marks are valid only if Attendance criteria are met**

*CCA: Class Continuous Assessment

*LCA: Laboratory Continuous Assessment

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B. Sc. Computer Science (Third Year) (Batch 2018-19)

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	MIT-WPU-BCS3301	Data Communication & Networking	Core	3	-	-	2	-	50	-	50	100
2	MIT-WPU-BCS3302	Introduction to UNIX & Shell Scripting	Core	3	-	-	2	-	50	-	50	100
3	MIT-WPU-BCS3303	Computer Graphics	Core	3	-		2		50	-	50	100
4	MIT-WPU-BCS3304	Lab Course-I (C#.Net)	Core	-	-	2	-	2	-	50	50	100
5	MIT-WPU-BCS3305	Lab Course-II (Computer Graphics)	Core	-	-	2	-	2	-	50	50	100
6	MIT-WPU-BCS3306	Elective IV	Elective	3	-	-	2	-	50	-	50	100
7	OEC	Generic Elective	Elective	3	-	-	2	-	50	-	50	100
		Total :	-	15	-	04	10	04	250	100	350	700

Type: Core/Elective

****Assessment Marks are valid only if Attendance criteria are met**

Weekly Teaching Hours: 19

*CCA: Class Continuous Assessment

Total Credits: Third Year B.Sc. Computer Science Trimester III: 14

*LCA: Laboratory Continuous Assessment

Total Third Year B.Sc. Computer Science Credits: 44

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Discipline Elective Courses:

	Code	Title	Code	Title	Code	Title
Elect I	MIT-WPU-BCS3106A	Mini Project	MIT-WPU-BCS3106B	Compiler Construction	MIT-WPU-BCS3106C	Computer Graphics
Elect II	MIT-WPU-BCS3107A	Mini Project	MIT-WPU-BCS3107B	Software Project Management	MIT-WPU-BCS3107C	Internet of Things
Elect III	MIT-WPU-BCS3206A	Mini Project	MIT-WPU-BCS3206B	Cyber Law & Security	MIT-WPU-BCS3206C	PHP Frameworks
Elect IV	MIT-WPU-BCS3306A	Mini Project	MIT-WPU-BCS3306B	Introduction to Data Science and Techniques	MIT-WPU-BCS3306C	Software Testing & Quality Assurance

MOOC Courses:

1. Introduction to Cyber security
2. R Programming
3. Introduction to Data Science
4. Cryptography
5. Building a Basic Website
6. Social Network Analysis
7. Foundations in Software Engineering

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1101**			
Course Category	**Core Computer Science**			
Course Title	**Introduction to Programming & Basic Programming using C**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1.Basic knowledge of computer programming terminologies
2.Introduction to problem solving

Course Objectives:

1. To develop Problem Solving abilities using computers.
2. To teach basic principles of programming.
3. To develop skills for writing simple programs using 'C'.

Course Outcomes:

On completion of the course, student will be able to–
1. Students will get the knowledge of basic principles of programming.
2. Students will develop problem solving abilities using computers.
3. Students will write simple 'C' programs using decision making statements and loop statements.

Course Contents:

Problem Solving using Computers : Introduce problem-solving concept, algorithms and flowcharts

Introduction to C : Covers history, structure of a C program, Application Areas, C Program development life cycle

C Tokens : Introduces data types and all C tokens

Data Input and Output functions : Covers functions related with character input and output, string input and output and formatted input and output

Control Structures : Covers decision making statements, loop control statements, break and continue

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Learning Resources:

Reference Books:
1. Let Us C, Yashavant P. Kanetkar
2. Problem Solving with C, Harrow
3. Programming in ANSI C, E. Balaguruswamy

Supplementary Reading: 1. The Complete reference to C, Herbert Schildt

Weblinks:
1. www.cprogramming.com/
2. www.w3schools.in/c-tutorial/

Pedagogy: Participative learning, discussions, algorithm, flowchart & program writing, demonstrations, practical, assignment.

Assessment Scheme:

Class Continuous Assessment (CCA) 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	10	10	-	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Problem Solving using Computers:** Problem-Solving, Writing Simple Algorithms, Flowcharts, Programming Languages as Tools	5	-	-
2	**Introduction to C:** History, Structure of a C program, Functions as building blocks, Application Areas, C Program development life cycle	5	-	-
3	**C Tokens:** Keywords, Identifiers, Variables, Constants – character, integer, float, string, escape sequences, Data types – built-in and user defined, Operators and Expressions, Operator types (arithmetic, relational, logical, assignment, bitwise,	5	-	1

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	conditional, other operators), Precedence and associativity rules for expression evaluation.			
4	**Data Input and Output functions:** Character input and output, String input and output, Formatted input and output	6	-	-
5	**Control Structures :** Decision making structures-If, if-else, switch, Loop Control structures-While, do-while, for, Nested structures, Break and continue	7	-	1

Prepared By	**Checked By**	**Approved By**
Mrs. Deepali Sonawane Assistant Professor	Dr. C. H. Patil BOS Chairman	Prof. Neeta Kankane Associate Dean

COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1102**			
Course Category	**Core Computer Science**			
Course Title	**Fundamentals of Database**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Elementary knowledge about computers.
2. Information about different business systems.

Course Objectives:

1. To understand data processing using computers.
2. To teach how to draw ERD by collecting a data from user.
3. To provide practical knowledge about how normalize database tables so that you can design and implement correct database systems.

Course Outcomes:

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

1. Students will able to understand how data management should be done using computer system.
2. Students should practically able to normalize database tables so that you can design and implement correct database systems.
3. Students should able to collect appropriate data from user for ERD.

Course Contents:

Introduction of DBMS - Introduction File system Vs DBMS. What are different Data models? What is Structure of DBMS? Who are Users of DBMS

Conceptual Design (E-R model) -What is ER data model (entities, attributes, entity sets, relations, relationship sets)What are Additional constraints (Key constraints, Mapping constraints)
Case studies to draw different ER diagrams.

Relational data model -How to convert ER to Relational model
What are different Integrity constraints (primary key, referential integrity, unique constraint, Null constraint, Check constraint)

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Relational Database Design-
What is Functional dependency
How find closure of F, Closure of an Attribute set, Concept of a Super Key and a primary key
What are different methods of Normalization-Normal forms 1NF, 2NF, 3NF, BCNF

Learning Resources:

Reference Books

1. Fundamentals of Database Systems (4th Ed) By: Elmasri and Navathe
2. Database System Concepts (4th Ed) By: Korth, Sudarshan, Silberschatz
3. Database Management System, Oracle, SQL and PL/SQL (2nd Ed) By Pranab Kumar Das Gupta & P. Radhakrishnan

Pedagogy:

Participative learning, discussions, algorithm, Program writing, experiential learning through practical problem-solving, assignment, PowerPoint presentation

Assessment Scheme:

Class Continuous Assessment (CCA) 50 Marks

Assignments	Test	Tutorial	Attendance	Viva	Any other
10	10	10	10	10	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction of DBMS** Introduction File system Vs DBMS Data models -relational, hierarchical, network Levels of abstraction Data independence Structure of DBMS	5	-	-

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	Users of DBMS Advantages of DBMS			
2	**Conceptual Design (E-R model)** Overview of DB design ER data model (entities, attributes, entity sets, relations, relationship sets) Additional constraints (Key constraints, Mapping constraints, Strong & Weak entities, aggregation / generalization) Conceptual design using ER modeling (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER) Case studies	9	-	1
3	**Relational data model** Structure of Relational Databases (concepts of a table, a row, a Relation, a Tuple and a key in a relational database) Conversion of ER to Relational model Integrity constraints (primary key, referential integrity, unique constraint, Null constraint, Check constraint) Case studies	5	-	-
4	**Relational Database Design** Pitfalls in Relational-Database Design Functional dependencies (Basic concepts, F+, Closure of an Attribute set, Concept of a Super Key and a primary key) Concept of Decomposition Desirable Properties of Decomposition (Lossless join & Dependency preservation) Concept of Normalization-Normal forms (only definitions) 1NF, 2NF, 3NF, BCNF Examples on Normalization	10	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1103**			
Course Category	**Core Computer Science**			
Course Title	**Fundamentals of mathematics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**2**	**1**	**-**	**2**

Pre-requisites: Students must have knowledge of Basic Mathematics, logic.

Course Objectives:

1. Knowledge (i) To get a relational understanding of mathematical concepts.

2. Skills (i) To translate information presented verbally into Mathematical form

3. Attitude (i) To get confidence to solve problems on integers, algebra.

Course Outcomes:

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

1. Student will understand basic concepts of Algebra theory.
2. They will be able to solve problems based on permutations, combinations
3. They can find the greatest common divisor by using division algorithm

Course Contents:

1. **Introduction to proofs**
   Types of Proofs, logic expressions, Logical equivalences.

2. **Boolean Algebra**
   Definations of Lttices , types of Lattices , Boolean expressions in DNF and CNF

3. **Sets, Relations & Functions**
   Types of sets, concepts of relation and function, representation of relations, Warshall's algorithm for transitive closure**.**

4. **Counting Principle**
   Addition rule, multiplication rule , examples on both , permutation , and combination.

5. **Divisibility of Integers**
   Definitions of G.C.D. and L.C.M. , division algorithm , Euclidean algorithm. Relatively prime integers , composite integers.

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Learning Resources:

Reference Books:

1. Discrete Mathematics and its Applications by Kenneth Rosen, (Tata McGraw Hill),
2. Elements of Discrete Mathematics by C. L. Liu , (Tata McGraw Hill)
3. Elementary Number Theory(7th Ed)by David Burton, (McGraw Hill Education)

Pedagogy:

Participative learning, discussions, demonstrations, assignment

Assessment Scheme:

Class Continuous Assessment (CCA) 50 Marks

Assignments	Test	Attendance
20	20	10

Term End Examination: 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to proofs** Mathematical Logic: Propositional logic, propositional equivalences, predicates & quantifiers Rule of inference, Methods of Proofs: Direct proofs, proof by contraposition, proof by contradiction	04	-	-
2	**Boolean Algebra** Partial ordered relations, Posets, Meet and join operations, lattices, Complemented Lattice, Distributive Lattice, Boolean functions and its representation, logic gates, minimizations of circuits by using Boolean identities and K-map.	05	-	1

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3	**Sets, Relations & Functions** Sets: Basics, set operations & Venn Diagrams, Relations: Types of relations, Equivalence Relations, Equivalence Classes, Transitive Closure, Warshall's Algorithm, Functions: Functions: one-to-one, onto, inverse, composition, graphs of some standard fun ctions	06	-	-
4	**Counting Principle** Basic rules: Addition Rule, Multiplications Rule, Principle of Inclusion & Exclusion, Pigeon hall principle, Permutations and combinations, Binomial coefficients and Pascal triangle	07	-	1
5	**Divisibility of Integers – I** Well ordering principle, First and second Principle of Mathematical Induction, Examples, Division Algorithm (without proof) , Divisibility and its properties, prime numbers, Definition G.C.D and L.C.M., Expressing G.C.D. of two integers as a linear combination of the two integers.	06	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1104**			
Course Category	**Core Computer Science**			
Course Title	**Basic Statistics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: the student must aware about the basic knowledge about use of calculator and integration and derivatives.

Course Objectives:

- **1. Knowledge:** To understand the Basic concepts and terminology in Statistics.
- **2. Skills:** To enhance the student with Basic tools and methods for data analysis such as central tendency, deviation methods and moments and graphical methods.

Course Outcomes:

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

1. Understand how frequency distribution are used in statistical analysis

2. Identify the proper measure of central tendency to use for each level of measurement

Course Contents

1. **Basic Concepts:** Data types and various types of graphical representation.
2. **Measures of Central tendency :** Basic measures of central tendency
3. **Measures of Dispersion:** Basic measures of dispersion range, variance, and standard deviation.
4. **Moments:** Raw and central moments.

Learning Resources:

Reference Books:

1. Fundamentals of Applied Statistics (3rd Ed) by Gupta S. C. and Kapoor V. K. S. Chand and Sons, New Delhi.
2. Business Statistics, By Naval Bajpai

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Pedagogy:
Participative learning, discussions, demonstrations, practical, assignment

Assessment Scheme:

Class Continuous Assessment (CCA) : 50 Marks

Assignments	Test	Attendance	Case study	MCQ	Oral	Any other
20	20	10	-	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Basic Concepts**: Raw data, attributes and variables, discrete and continuous variables. Presentation of data using frequency distribution and cumulative frequency distribution	4	-	1
2	**Measures of Central tendency:** Mean, Mode, Median. Partition values: Quartiles, Box- Plot.	8	-	2
3	**Measures of Dispersion:** Variance, Standard Deviation, Coefficient of Variation. (For Raw data, ungrouped frequency distribution, Exclusive type frequency distribution)	5	-	1
4	**Moments:** Raw and Central moments: definition, computations for ungrouped and grouped data (only up to first four moments).Relation between raw and central moments up to fourth order.	3	-	1
5	Measures of skewness-Pearson's measure, Bowley's measure, β_1, γ_1.Kurtosis of a frequency distribution, measure of kurtosis (β_2,γ_2) based upon moments	4	-	1

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1105**			
Course Category	**Core Computer Science**			
Course Title	**Principles of Analog Electronics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: :
1. Basics of physics & Analog Electronics

Course Objectives:
1. To get familiar with basic circuit elements and passive components
2. To study comparative aspects of logic families
3. To understand DC circuit theorems and their use in circuit analysis
4. To provide in-depth knowledge of scientific and technological aspects of electronics

1. Knowledge i) Basic Electronics
(ii) Physics

2. Skills (i) Technical and practical skills.
(ii) Soft skills

Course Outcomes:
On completion of the course, student will be able to–
1. Basic concepts of Semiconductor Devices.
2. Different aspects of BJT, MOSFET and OPAMP.
3. DC circuit theorems and their use in circuit analysis

Course Contents:
Basic Electronics and Circuit Theorems
Semiconductor diode and circuits
Transistor and Circuits
Field Effect Transistor
Operational Amplifier

Learning Resources:

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Reference Books:

1. Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principals of Electronics: V.K. Mehta, S.Chand and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.
5. Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., Gupta S.C., Tata McGraw Hill.

Web Resources:

www. analogelectronics .com

Pedagogy:

Participative learning, discussions, demonstrations, case studies, practical, assignments etc.

Assessment Scheme:

Class Continuous Assessment (CCA) 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
30	20	-	-	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Basic Electronic Circuits and Circuit Theorems** Concept of Ideal Voltage and Current source, internal resistance, dc sources (voltage/current) Ohms law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Thevenin's theorem, Norton's theorem	8	-	-
2	**Semiconductor Diodes and Circuits.** Study of semiconductor devices with reference to symbol, working principle, I-V characteristics, parameters, specifications:	5	-	-

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	diode, zener diode, light emitting diode, photo diode, optocoupler, Rectifiers (half ,full wave, bridge), rectifier with capacitor-filter, Zener regulator,			
3	**Transistors and Circuits** Bipolar Junction Transistor (BJT) symbol, types, construction, working principle, I-V characteristics, parameters, specifications, Concept of amplification, Voltage divider biasing, DC load line (CE), Q point and factors affecting the stability, transistor as a switch,	8	-	-
4	**FETs and Applications** Symbol, types, construction, working principle, I-V characteristics, of: Metal Oxide Semiconductor FET (MOSFET), MOSFET Applications: MOSFET as a switch	5	-	-
5	**Operational Amplifier** Symbol, block diagram, OPAMP characteristics, basic parameters (ideal and practical) such as input and output impedance, bandwidth, differential and common mode gain, CMRR, slew rate, Concept of virtual ground, concept of feedback, Information about IC741 OPAMP as inverting and non-inverting amplifier, OPAMP as a comparator and Unity gain amplifier	4	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1201**			
Course Category	**Core Computer Science**			
Course Title	**Modular Programming using 'C'**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:
1. Introduction to Programming and Basics Programming Using C.

Course Objectives:

1. Knowledge (i) To understand modular programming concepts like function, pointers, array and string.

2. Skills (i) To develop skills for writing programs using 'C'

Course Outcomes:
On completion of the course, student will be able to–
1. Students will get the knowledge of 'C' programming concepts like function, pointer**s,** array and string.
2. Students will develop their skills for writing 'C' programming.
3. Students will able to write 'C' programs using functions, pointers, array and string.

Course Contents:

1. Arrays
Introduction to Array and declaration and initialization of arrays, types of arrays and its advantages and disadvantages

2. Strings
Declaration and initialization of strings. Use of standard string related library functions and the operations on string.

3. Functions in C
Introduction to functions and how to declare and define the user defined functions. Types of parameters in function call.

4. Pointers
Introduction to pointers its initialization and the arithmetic on pointers and how to use pointers in functions.

Learning Resources:

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Reference Books:

1. Let Us C, Yashavant P. Kanetkar
2. Problem Solving with C, Harrow, 3. Programming in ANSI C, E. Balaguruswamy
3. The Complete reference to C, Herbert Schildt

Weblinks:

1. www.cprogramming.com/
2. www.w3schools.in/c-tutorial/

Pedagogy:

Participative learning, discussions, Program writing, demonstrations, practical, assignment

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	10	10	-	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Arrays** Introduction to Array Declaration and initialization of array Types of Array– one, two and multidimensional Passing arrays to functions Arrays and pointers Applications of array Advantages and Disadvantages of	7	-	-
2	**Strings** Declaration and initialization of strings Standard library functions for handling of stings Strings and pointers Array of strings	7	-	1
3	**Functions**	8	-	-

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	Function Introduction and Needs Advantages of Functions Types of Function: Standard library Functions, User defined Functions Storage class Specifiers, Recursive Function			
4	**Pointers** Introduction to pointers Pointer declaration, initialization Accessing value through a pointer Pointer arithmetic Pointer to pointer Functions and pointers – passing pointers to functions, function returning pointers Dynamic memory allocation	6	-	1

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1202**			
Course Category	**Core Computer Science**			
Course Title	**Relational Database Management system**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:
1. Knowledge of DBMS

Course Objectives:

1. To explain the roles that databases play in organizations.
2. To provide practical knowledge of how use the Structured Query Language (SQL) in depth and obtain ample hands-on practice.
3. To teach importance and use database transactions and concurrency.
4. To teach techniques of recovery of data from crash.

Course Outcomes:

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

1. Students should able to create a Term Project that covers all aspects of designing a database and the SQL requests that run against that database.
2. Students should understand importance and use database transactions and concurrency.
3. Students should understand techniques of recovery of data from crash.

Course Contents:

Basic SQL using MySQL - Structure, Datatypes, DDL,DML aggregate functions

Advanced SQL using MySQL – SQL clauses, procedures and triggers

Transaction Concepts – Transaction state, types, serializability, concurrency

Crash Recovery – Crash recovery algorithms and examples.

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Learning Resources:

Reference Books:

1. Fundamentals of Database Systems (4th Ed) By: Elmasri and Navathe
2. Database System Concepts (4th Ed) By: Korth, Sudarshan, Silberschatz
3. Database Management System, Oracle, SQL and PL/SQL (2nd Ed) By Pranab Kumar Das Gupta & P. RadhaKrishnan

Web Resources:

1. https://www.tutorialspoint.com/dbms
2. www.studytonight.com/dbms
3. www.w3schools.in/dbms

Pedagogy: Participative learning, discussions, PowerPoint presentation and experiential learning through practical problem solving.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	10	10	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Basic SQL using MySQL** Introduction, Basic structure, Data types, Language structure (DDL,DML commands), Set operations, Aggregate functions, Nested Sub queries Modifications to Database.	8	-	1
2	**Advanced SQL using MySQL** Sql Clauses: Group By, Order By, Having, Set operations ,Aggregate functions in SQL, Control structures, Nested Sub queries, Views, Stored Functions, Stored Procedures, Cursors, Triggers.	7	-	1

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3	**Transaction Concepts** 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).	10	-	-
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.	3	-	-
		30	-	-

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COURSE STRUCTURE

Course Code	**MIT-PU-BCS1203**			
Course Category	**Core Computer Science**			
Course Title	**Graph Theory**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**2**	**1**	**-**	**2**

Pre-requisites:

1. Students must have knowledge of set theory, Number theory.

Course Objectives:

1. Knowledge (i) To get a relational understanding of mathematical concepts.

2. Skills (i) To translate information presented verbally into Mathematical form

3. Attitude (i) To get confidence to solve problems

Course Outcomes:

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

1. Student will understand basic concepts of Graph theory.
2. Students can apply concepts learnt in Graph a theory.

Course Contents:

1. Graphs

Definition, Elementary terminologies and results, Graphs as Models. Special types of graphs. Isomorphism. Adjacency and Incidence Matrix of a Graph.

2. Operations on Graphs

Subgraphs, induced subgraphs, Vertex deletion, Edge deletion. Complement of a graph and self-Complementary graphs. Union, Intersection and Product of graphs. Fusion of vertices.

3. Connected Graphs

. cut set, edge-connectivity, vertex Connectivity. Weighted Graph and Dijkstra's Algorithm

4. Trees

Binary Tree , tree traversal, Kruskal's algorithm

5 : Coloring

Chromatic number and chromatic polynomial, Four color theorem, five color theorem,

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Learning Resources:

Reference Books:

1) Kenneth Rosen, Discrete Mathematics and It's Applications (Tata McGraw Hill)

2) C. L. Liu ,Elements of Discrete Mathematics, (Tata McGraw Hill)

3) John Clark and Derek Holton, A First Look at Graph Theory (Allied Publishers)

4) Narsingh Deo, Graph Theory with Applications to Computer Science and Engineering, (Prentice Hall).

Supplementary Reading:

1) R. Balakrishnan, K. Ranganathan ,A Textbook of Graph Theory(Springer

Pedagogy:

Participative learning, discussions, demonstrations, assignment

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Attendance
20	20	10

Term End Examination: 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Graphs** Definition, Elementary terminologies and results, Graphs as Models. Special types of graphs. Isomorphism. Adjacency and Incidence Matrix of a Graph.	4	-	

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2	**Operations on Graphs** Subgraphs, induced subgraphs, Vertex deletion, Edge deletion. Complement of a graph and self-Complementary graphs. Union, Intersection and Product of graphs. Fusion of vertices.	7	-	1
3	**Connected Graphs.** Walk, Trail, Path, and Cycle: Definitions and elementary properties. Connected Graphs: definition and properties. Distance between two vertices, eccentricity, center, radius and diameter of a graph. Isthmus, Cutvetex: Definition and properties. cut set, edge-connectivity, vertex Connectivity. Weighted Graph and Dijkstra's Algorithm	7	-	1
4	**Trees** Definition, Properties of trees. Center of a tree. Binary Tree : Definition and properties. Tree Traversal : Ordered rooted Tree, Preorder traversal, in order traversal and post order traversal Prefix Notation. Spanning Tree: Definition, Properties, Shortest Spanning Tree, Kruskal's Algorithm.	5	-	1
5	**Coloring** Chromatic Number, Chromatic Polynomial the six and five color theorems, the four color theorem	4	-	

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COURSE STRUCTURE

Course Code	MIT-WPU-BCS1204			
Course Category	Core Computer Science			
Course Title	Probability Theory			
Teaching Scheme and Credits	L	T	Laboratory	Credits
Weekly load hrs	3	-	-	2

Pre-requisites:

1. This subject develops the building blocks of probability theory that are necessary to understand Statistical inference.

Course Objectives:

- **Knowledge**: Quantification or the possibility of an occurrence based on through analysis and measurements as opposed to subject evaluation.
- **Skills:** To enhance the student with Basic tools and methods for data analysis such as central tendency, deviation methods and moments.

Course Outcomes:

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

1. Know the most widely used probability distributions and recognize them in applications
2. Recognize the importance of the central limit theorem and understand when it is Appropriate to use normal approximations for the distribution of a statistic.

Course Contents:

Counting Principles: Basic concepts of permutation, combination.
Discrete Random Variable and discrete distributions : Discrete random variable, Expectation/mean, variance
Standard discrete distributions: Uniform, Binomial, Poisson, Geometric and Negative Binomial distribution.
Joint distributions of discrete random variables: Independence, conditional distributions of joint distribution function.

Learning Resources: 1. Fundamentals of Applied Statistics (3rd Ed) by Gupta S. C. and Kapoor V. K. S. Chand and Sons, New Delhi.
2.Statistical Methods by Snedecor G. W. & Cochran W. G. John Wiley & Sons.

Web Resources: onlinestatbook.com/2/probability/basic.html

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Pedagogy:
Participative learning, discussions, demonstrations, practical, assignment

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	20	-	-	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Permutation, and Combination**:.Concept of Probability,Deterministic and non-determination models. Random Experiment, Sample Spaces (finite and count ably infinite). Events: types of events, Operations on events. Probability - classical definition, probability models, axioms of probability, probability of an event	5	-	1
2	**Discrete Random Variable and discrete distributions :** Discrete random variable, probability mass function, Expectation/mean, variance, moments, functions of discrete random variables, moment generating functions. Probability generating functions	3	-	1
3	**Standard discrete distributions**: Uniform, Binomial, Poisson, Geometric and Negative Binomial distribution.	12	-	3
4	**Joint distributions of discrete random variables :** Independence, conditional distributions,	4	-	1

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1205**			
Course Category	**Core Computer Science**			
Course Title	**Principles of Digital Electronics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: :
1. Basic of electronics, Basic terms related to Binary No. system

Course Objectives:

1. To study characteristic features logic gates.
2. To understand basics of Boolean Algebra
3. To provide in-depth knowledge of scientific and technological aspects of electronics
4. To familiarize with current and recent technological developments
5. To enrich knowledge through programs such as industrial visits, hobby projects, market survey, projects etc.
6. To train students in skills related to electronics industry and market.

1. Knowledge i) Basic Electronics
(ii) Binary Number System

2. Skills (i) Technical and practical skills.
(ii) Soft skills

Course Outcomes:

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

1. All basic gates and Boolean algebra.
2. Simplification of Boolean Expressions.
3. The basics parameters ICs

Course Contents:

Logic Gates
Number System and Binary Arithmetic
Number System and Karnaugh Map
Logic Families

Learning Resources:

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Reference Books:

1. Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Web Resources:

www.digital world.com
www.digitalelectronics.com

Pedagogy:

Smart boards, Participative learning, Group Discussion , Presentations , etc .

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
30	20	-	-	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Logic Gates** Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR, EX-OR) Symbol and truth table, Applications of Ex-OR gates as parity checker and generator.	6	-	-
2	**Number Systems and Binary Arithmetic** Introduction to decimal, Binary and hexadecimal number systems and their interconversions, Signed and fractional	8	-	-

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	binary number representations, BCD, Excess-3 and Gray codes, alphanumeric representation in ASCII codes. Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Full subtractor, Four bit parallel adder, , Introduction to ALU.			
3	**Boolean algebra and Karnaugh maps** Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, De Morgan's theorem, Universal gates, Boolean expression in SOP and POS form, conversion of SOP/POS expression to its standard SOP/POS form., Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (up to 4 bit).	8	-	-
4	**Logic Families** Introduction to Integrated circuit technologies TTL, ECL, CMOS IC parameters: Logic levels, switching speed, propagation delay, power dissipation, Noise margins and fanout of TTL and CMOS. TTL NAND & NOT gate, Introduction to IC 555 and Multi vibrators Astable , Bistable and Monostable	8	-	-

Prepared By	**Checked By**	**Approved By**
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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1301**			
Course Category	**Core Computer Science**			
Course Title	**Advanced Programming Using C**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:
1. Basic knowledge of computer programming terminologies
2. Knowledge of C programming concepts like data type, control structure, arrays, pointers, strings, functions.

Course Objectives:

1. To teach 'C' programming concepts like Structures and Unions, File Handling, C Preprocessor, Graphics using C
2. To develop skills for writing programs using 'C'

Course Outcomes:
On completion of the course, student will be able to–
1. Students will get the knowledge of 'C' programming concepts like Structures and Unions, File Handling, C Preprocessor, Graphics using C.
2. Students will develop their skills for writing 'C' programming.

Course Contents:

Structures and Unions: Covers concept of structure and union. Use of structure and union with arrays, pointers and functions.

File Handling: Covers streams, Types of Files, Different operations on file.

C Preprocessor : Covers different types of preprocessor

Graphics using C: Introduce Graphics driver and graphics mode, Drawing simple graphical objects.

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Associate Dean

Learning Resources:

Reference Books:

1. Let Us C, Yashavant P. Kanetkar
2. Problem Solving with C, Harrow
3. Programming in ANSI C, E. Balaguruswamy

Weblinks:

1. www.cprogramming.com/
2. www.w3schools.in/c-tutorial/

Pedagogy: Participative learning, discussions, algorithm, flowchart & program writing, demonstrations, practical, assignment.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	10	10	-	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Structures and Unions :** Introduction and need of structures and unions, Creating structures, Accessing structure members (dot Operator) , Structure initialization, Array of structures, Passing structures to functions, Nested structures, Pointers and structures, Self-referential structure, Unions, Difference between structures and unions	08	-	-
2	**File Handling:** Streams, Types of Files, Operations on files, Random access to files, Command Line Arguments	08	-	1
3	**C Preprocessor:** Format of Preprocessor directive, File Inclusion directive, Macro substitution, Nested macro, Argumented macro	07	-	-
4	**Graphics using C:** Graphics driver and graphics mode, Drawing simple graphical objects- line, circle, rectangle etc., Outputting text, curves and polygons	05	-	1

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1302**			
Course Category	**Core Computer Science**			
Course Title	**System Analysis and Design**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:
1. Introduction to Programming and Basics Programming Using C, Modular programming concepts and the RDBMS concept

Course Objectives:

1. Knowledge

(i) This course aims to introduce students to the basic principles of systems analysis and design

2. Skills

(i) How to create data dictionary and how to write Pseudo code in Structured English
(ii) Data Flow Diagram
(iii) To involve students into development of a sample project (term project).

Course Outcomes:

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

1. Students will understand the basic principles of systems analysis and design.
2. Students will understand the role systems analyst in system design.
3. Student should able draw data dictionary, Pseudo code, Structured English, Data Flow Diagram
4. Students should able to complete sample project.

Course Contents:

1. System Concepts

It covers the definition of system and what are the different types of systems and the elements of the system. It covers the role of system analyst. How the System Analysis is done

2. System Development Life Cycle

It covers what is system development life cycle. How it is used in development of the software form initial state to the final

3. System Analysis Methods

It covers and teaches how to do the analysis of system for the development of the software.

4. System Design Methods

It covers and teaches how to do the documentation and the actual designing and the development of the software.

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Associate Dean

Learning Resources:

Reference Books:

1. System Analysis and Design Methods, Whitten, Bentaly and Barlow, Galgotia Publication.7th Edition
2. System Analysis and Design Elias M. Award, Galgotia Publication 2nd Edition
3. Modern System Analysis and Design, Jeffrey A. Hofer Joey F. George Joseph S. Valacich Addison Weseley

Weblinks:

1. https://www.tutorialspoint.com/system_analysis_and_design
2. www.studytonight.com/

Pedagogy:

Participative learning, discussions, PowerPoint presentation and experiential learning through practical problem solving.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Case Study	Attendance	MCQ	Oral	Any other
20	10	10	10	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**System Concepts** What is system The elements of system Types of systems Knowledge and qualities expected in system analyst	5	-	-

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	Main objective of system analyst Role of system analyst			
2	**System Development Life Cycle** What is SDLC? System analysis specifications System design specifications System Coding System Implementation and maintenance System Evaluation	6	-	1
3	**System Analysis Methods** Fact findings techniques Problem identification Feasibility study and cost benefits analysis Case study	7	-	-
4	**System Design Methods** Flow charting Decision table and decision Tree Data dictionary Pseudo code Structured English Data Flow Diagram Case study	10	-	1

Prepared By	**Checked By**	**Approved By**
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Course Code	MIT-WPU-BCS1303			
Course Category	Core Computer Science			
Course Title	Number Theory & Calculus			
Teaching Scheme and Credits	L	T	Laboratory	Credits
Weekly load hrs	2	1	-	2

Pre-requisites:

1. Students must have knowledge of Basic in, Number theory from trimester I, set theory

Course Objectives:

1. Knowledge (i) To get a relational understanding of mathematical concepts.

2. Skills (i) To translate information presented verbally into Mathematical form

3. Attitude (i) To get confidence to solve problems

Course Outcomes:

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

1. Student will understand basic concepts of Number Theory & Calculus
2. Students can apply concepts learnt in Number Theory & Calculus

Course Contents:

1. Divisibility of Integers – II

Euclidean Algorithm (Without proof). Relatively prime integers, Euclid are Lemma and its generalization. Congruence relations and its properties, Residue Classes: Definition, Examples,
addition and multiplication modulo n and composition tables Euler's and Fermat's Theorems. (Without proof)

2. Recurrence Relations:

Recurrence Relations: Introduction, Formation. Linear Recurrence Relations with constant coefficients. Homogeneous Solutions. Particular Solutions. Total Solutions

3. Continuity and Differentiability

Continuity and Properties of continuous functions defined on [a, b] (Without proof) and examples.
Differentiability Theorem – Differentiability implies continuity but not conversely. Left hand Derivative and Right hand derivative. Intermediate value theorem (without proof). Rolle's theorem (without proof and geometric interpretation) Lagrange's Mean Value Theorem (without proof and geometric interpretation) Cauchy's Mean Value Theorem (without proof), Verification and Application. L' Hospital's Rule (without proof)

4. Taylor's and McLaurin's series

The nth derivatives of standard functions. Leibnitz's Theorem (with proof). Taylor's and McLaurin's Theorems with Lagrange's and Cauchy's form of remainders (without proof).

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Associate Dean

Taylor's and McLaurin's Series n = 3)

Learning Resources:

Reference Books:

1. Discrete Mathematics Structure – Bernard Kolman, Robert Busby, Sharon Cutler Ross,
   Nadeem-ur-Rehman, Pearson Education, 5th Edition
2. Elements of Discrete Mathematics – C.L.Liu (Tata McGraw Hill)
3. Calculus and Analytical Geometry- Thomas Finny

Pedagogy:

Participative learning, discussions, demonstrations, assignment

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Attendance
20	20	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Divisibility of Integers** – II Euclidean Algorithm (Without proof). Relatively prime integers, Euclid are Lemma and its generalization. Congruence relations and its properties, Residue Classes: Definition, Examples, addition and multiplication modulo n and composition tables Euler's and Fermat's Theorems. (Without proof)	8	-	1

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2	**Recurrence Relations:** Recurrence Relations: Introduction, Formation. Linear Recurrence Relations with constant coefficients. Homogeneous Solutions. Particular Solutions. Total Solutions	8	-	-
3	**Continuity and Differentiability** Continuity and Properties of continuous functions defined on [a, b] (Without proof) and examples. Differentiability Theorem – Differentiability implies continuity but not conversely. Left hand Derivative and Right hand derivative. Intermediate value theorem (without proof). Rolle's theorem (without proof and geometric interpretation) Lagrange's Mean Value Theorem (without proof and geometric interpretation) Cauchy's Mean Value Theorem (without proof), Verification and Application. L' Hospital's Rule (without proof **)**	6	-	1
4	**Taylor's and Maclaurin's series** The nth derivatives of standard functions. Leibnitz's Theorem (with proof). Taylor's and Maclaurin's Theorems with Lagrange's and Cauchy's form of remainders (without proof). Taylor's and Maclaurin's Series	6	-	-

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COURSE STR UCTURE

Course Code	**MIT-WPU-BCS1304**			
Course Category	**Core Computer Science**			
Course Title	**Correlation and Regression Analysis**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:
1. This course gives clear idea of how to investigate the strength and direction of a relationship between two variables by collecting measurements and using appropriate statistical analysis.

Course Objectives:

1) **Knowledge** To understand the Basic concepts and terminology in Statistics
2) **Skills** To enhance the student with Basic tools and methods for data analysis

Course Outcomes:

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

1. Distinguish between a deterministic relationship and a statistical relationship
2. Understand the concept of the least squares criterion

Course Contents:

Continuous distribution: Pdf and various continuous distribution
Correlation : Concept and calculation of correlation
Regression (for ungrouped data) :concept of Regression along with proof and numerical questions.
Multiple and Partial Correlation and Regression (for trivariate data) : yules notation, concept and numerical questions on multiple and partial correlation.

Learning Resources:

Reference Books:

1. Fundamentals of Applied Statistics (3rd Ed) by Gupta S. C. and Kapoor V. K. S. Chand and Sons, New Delhi.
2.Statistical Methods by Snedecor G. W. & Cochran W. G. John Wiley & Sons.
3.Anderson, D., Sweeney, D., & Williams, T. (2000). Essentials of Statistics for Business and Economic. South Western College Publishing.

Web Resources:
http://math.arizona.edu/~jwatkins/c-regression.pdf

Pedagogy:
Participative learning, discussions, demonstrations, practical, assignment

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Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	20	-	-	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	Continuous distribution, probability density function, mean and median. Uniform distribution, Exponential distribution, Normal distribution, Pareto distribution , mean and variance Exponential distribution –Lack of memory property. Normal distribution – Additive Property.	14	-	1
2	**Correlation:** Bivariate data, Scatter diagram. Correlation, Positive Correlation, Negative Correlation, Zero Correlation Karl Pearson's coefficient of correlation (r), limits of r ($-1 \leq r \leq 1$),interpretation of r, rank correlation.	5	-	1
3	**Regression (for ungrouped data) :** Regression: illustrations, appropriate situations for regression and Correlation. Linear Regression. Fitting of straight line using least square method .Non Linear regression models: second degree curve, growth curve Models .i) $Y = ae^{bX}$ ii) $Y = ab^{X}$ iii) $Y = aX^{b}$ iv) logistic model $Y = k / (1+e^{a+bx})$. Residual plot, mean residual sum of squares (m. s. s)	4	-	1
4	**Multiple and Partial Correlation and Regression (for trivariate data)** Yule's notation and concept of multiple regression. Fitting of multiple regression plane. Partial regression coefficient, interpretation. Multiple correlation coefficient, concept, definition, computation and Interpretation .Partial correlation coefficient, concept, definition, computation and interpretation	3	-	1

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS1305**			
Course Category	**Core Computer Science**			
Course Title	**Advanced Digital Electronics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Basic of electronics, Basic terms related to Binary No. system

Course Objectives:

1. To learn the combinational circuits
2. To understand sequential circuits.
3. To learn the designing of sequential circuits.

To understand the concepts of memory

1. Knowledge i) Basic Digital Electronics
(ii) Binary Number System

2. Skills (i) Technical and practical skills.
(ii) Soft skills

Course Outcomes:

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

1. Basic Combinational Circuits
2. Sequential circuits and their designing
3. Memory concepts and its expansion

Course Contents:

Combinational Circuit
Sequential Circuit
Designing of Sequential Circuits
Memory Organization

Learning Resources:

Reference Books:

1. . Digital Electronics: Jain R.P., Tata McGraw Hill
2. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
3. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Web Resources:

www.digital world.com
www.digitalelectronics.com
http://nptel.ac.in
http://www.howstuffworks.com/

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Associate Dean

Pedagogy:
Smart boards, Participative learning , Group Discussion , Presentations etc

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
30	10	-	-	10	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Combinational Circuits.** Multiplexer (2:1, 4:1), demultiplexer (1:2, 1:4) and their applications, Code converters - Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & decoder 3x4 matrix keyboard encoder, priority encoder,BCD to seven segment decoder. Designing of ALU	**7**	**-**	**-**
2	**Sequential Circuits.** Flip flops: RS using NAND/NOR, latch, clocked RS, JK, Master slave JK, D and T. Counters: Asynchronous and Synchronous Counter. Working of 3 bit asynchronous counter up /down counter with timing diagram. Concept of modulus counters, Decade counter. Shift registers: SISO, SIPO, PISO, PIPO shift registers, ring counter, Johnson Counter.	10	-	-
3	**Designing of Sequential circuits.** Concept of Excitation Table, Designing of 3 bit synchronous counter. Designing of Random sequence generator.	5	-	-
4	**Memory organization.** Concept of Memory, types of memory, parameters of memory, Memory hirechary , Memory expansion(capacity and word size), Concept of cache memory , Cache memory mapping techniques(Associative , Direct and Set Associative),.	8	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2101**			
Course Category	**Core Computer Science**			
Course Title	**Web Development**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. An intermediate knowledge of HTML & CSS, Scripting language Basics

Course Objectives:

1. Introducing students to the web browser and web server
2. To understand language basics and lexical structure of JavaScript and JQuery
3. To understand designing a web page with the help of HTML, CSS, JavaScript or jQuery

Course Outcomes:

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

1. Design dynamic websites that meet specified needs and interests.
2. Write well-structured, easily maintained JavaScript code following accepted good practice.
3. Write JavaScript code that works in all major browsers (including IE, Mozilla-based browsers such as Firefox, Opera, Safari, and Chrome).

Course Contents:

Introduction to Web Design with HTML and CSS

How to create the web pages using HTML

JavaScript

Focuses on the creation of dynamic web pages and the client side programming

JQuery

Making of website dynamic and application of various components on web pages to handle the events and the fetching of data from the server side

Learning Resources:

Reference Books:

1. HTML and CSS: Design and Build Websites by Jon Duckett.
2. Learning JQuery
3. Smashing CSS
4. Eloquent JavaScript by Marijn Haverbeke

Web Resources:

1. www.w3schools.com/
2. www.codecademy.com/courses/html-javascript-css
3. www.tutorialspoint.com/jquery/

Pedagogy:

Participative learning, discussions, algorithm, experiential learning through practical problem solving, assignment, PowerPoint presentation

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Associate Dean

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	10	-	10	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to Web Design with HTML and CSS** Web Development Introduction, HTML Text Formatting, Elements, Attributes and Styles, Tables HTML Lists, HTML Forms, Cascading Style Sheets I, Cascading Style Sheets II, CSS Page, Layout and Element Positioning, Creating Your First HTML Web Site	10	-	-
2	**JavaScript** Overview of JavaScript, DHTML, Object Orientation and JavaScript , Basic Syntax (JS datatypes, JS variables), Primitives, Operations and Expressions, Screen Output and keyboard input, Verification and Validation), JS Control statements, JS Functions, JavaScript HTML DOM Events (onmouseup, onmousedown, onclick, onload, onmouseover, onmouseout). JS Strings, JS String methods, JS popup boxes (alert, confirm, prompt), Changing property value of different tags using DHTML (ex. adding innerhtml for DIV tag, changing source of image etc.).	9	-	1
3	**JQuery** JQuery Introduction, JQuery Install, JQuery Syntax, JQuery Selectors, JQuery Event Methods, JQuery Effects - Hide and Show, JQuery Effects – Fading, JQuery Effects - Sliding, JQuery Effects – Animation, JQuery Stop Animations, JQuery Callback Functions, JQuery - Chaining JQuery - Get Content and Attributes, JQuery - Set Content and Attributes, JQuery - Add Elements JQuery - Remove Elements, JQuery - Get and Set CSS Classes, JQuery - css() Method	9	-	1

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2102**			
Course Category	**Core Computer Science**			
Course Title	**Object Oriented Software Engineering**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Data structures.
2. Object Oriented Programming (eg: CPP)
3. Basic knowledge of Graphs and Algorithms.

Course Objectives:

1. Understand the entire software engineering project process, which consists of object-oriented analysis, design, programming and testing.
2. Understand basic object-oriented programming concepts;
3. Effectively use the main features of the object-oriented programming language Java;
4. Gain experience in implementing object-oriented programs in Java;
5. Apply an iterative, use case-driven process to the development of a robust design model;
6. Use the UML to represent the design model;
7. Apply the OO concepts abstraction, encapsulation, inheritance, hierarchy, modularity, and polymorphism to the development of a robust design model
8. Design and implement a software system using object-oriented software engineering paradigm.

Course Outcomes:

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

1. Students will understand the entire software engineering project process, which consists of object-oriented analysis, design, programming and testing;
2. Students will understand basic object-oriented programming concepts;
3. Students will be able to effectively use the main features of the object-oriented programming language Java;
4. Students will gain experience in implementing object-oriented programs in Java;
5. Students will apply an iterative, use case-driven process to the development of a robust design model;
6. Students will use the UML to represent the design model.

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Associate Dean

Course Contents:

SDLC
Software life cycle models: Waterfall, RAD, Spiral, Open-source, Agile process
Understanding software process Process metric CMM levels
Planning
Planning & Estimation: Product metrics, Estimation- LOC, FP, COCOMO models.
Project Management: Planning, Scheduling, And Tracking.
Workflow of Software life cycle
Workflow diagram for the system. All the UML diagrams in details
Testing & Software Quality
Testing: FTR – Walkthrough and Inspection, Unit Testing, Integration, System and Regression Testing, User Acceptance Testing Software Quality – Quality Standards , Quality Matrices
Testing & SQA: FTR, unit testing, integration testing, product testing, and acceptance testing
Software Management
Software Configuration Management: Managing and controlling Changes, Managing and controlling versions
Maintenance
Types of maintenance Log and defect reports. Reverse and re-engineering

Learning Resources:

Reference Books:

1. Object Management Group (OMG): http://www.omg.org/. This is the official Site for UML.

2. Design Patterns: Elements of Reusable Object-Oriented Software with Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, 2003

Pedagogy:
Participative learning, discussions, algorithm, Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Case study	Attendance	Viva	Any other
10	10	10	10	10	-

Term End Examination : 50 Marks

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Associate Dean

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**SDLC** Software life cycle models: Waterfall, RAD, Spiral, Open-source, Agile process Understanding software process Process metric CMM levels	4	-	-
2	**Planning** Planning & Estimation: Product metrics, Estimation- LOC, FP, COCOMO models. Project Management: Planning, Scheduling, And Tracking.	5	-	-
3	**Workflow of Software life cycle** Requirement Workflow: Functional , Nonfunctional, characteristics of Requirements, Requirement Elicitation techniques, Requirement Documentation –Use case specification, Activity Diagram, Analysis workflow:Static Analysis, Identifying Object – Methods of identifying objects and types - Boundary, Control, Entity, Dynamic Analysis, Identifying Interaction – Sequence and Collaboration diagrams, State chart diagram Design Workflow: System Design Concept – Coupling and Cohesion, Architectural Styles, Identifying, Subsystems and Interfaces, Design Patterns Implementation Workflow:Mapping models to Code, Mapping Object Model to Database Schema	5	-	1
4	**Testing & Software Quality** Testing: FTR – Walkthrough and Inspection, Unit Testing, Integration, System and Regression Testing, User Acceptance Testing Software Quality – Quality Standards , Quality Matrices Testing & SQA: FTR, unit testing, integration testing, product testing, and acceptance testing	5	-	-
5	**Software Management** Software Configuration Management: Managing and controlling Changes, Managing and controlling versions	4	-	-
6	**Maintenance** Types of maintenance Log and defect reports. Reverse and re-engineering	5	-	1

Prepared By	**Checked By**	**Approved By**
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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2103**			
Course Category	**Core Computer Science**			
Course Title	**Algebra & Cryptography**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**2**	**1**	**-**	**2**

Pre-requisites:

1. Students must have knowledge of set theory, Number theory.

Course Objectives:

1. Knowledge (i) To get a relational understanding of mathematical concepts .

2. Skills **(i)** To translate information presented verbally into Mathematical form

3. Attitude **(i)** To get confidence to solve problems

Course Outcomes:

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

1. Students will be able to apply their methods of proofs to prove the statements.
2. Students can apply concepts learnt in Group theory.

Course Contents:

1. Matrices and System of Linear Equations

Elementary operations on matrices, Echelon form of matrix, System of linear equations: Gauss Elimination Method, Gauss –Jordan Elimination Method, L.U. Decomposition Method, Rank of matrix, Row rank, Column rank

2. Groups

Binary operation, examples, properties of binary operations, Definition of Monod, semi group, examples, Definition of group and examples, finite and infinite groups, permutation groups, Subgroups Cyclic group, normal subgroup, Products and quotients of groups.

3. Coding

Coding of binary information and error detection, Decoding and error correction. Public Key Cryptography, Candidate One-way Functions, RSA.

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Associate Dean

Learning Resources:

Reference Books:

1. Elementary Linear Algebra (Applications Version) (7th Ed) by Howard Anton, Chris Rorres. John Wiley & Sons, Inc.
2. Algebra by M. Artin, , Prentice Hall of India , New Delhi, (1994).
3. Linear Algebra and its Applications(3rd Ed.) by G. Strang,. Harcourt Brace Jovanovich, Orlando, (1988).
4. A. First Course in Abstract Algebra(3rd Ed.) J.B. Fraleigh,., Narosa, New Delhi
5. Abstract Algebra, (3rd Ed) by David S. Dummit , Richard M. Foote,Jon Wiley & Sons, Inc.
6. Codes for Error Detection by Torleiv Kløve

Pedagogy:

Participative learning, discussions, demonstrations, assignment

Assessment Scheme:

Class Continuous Assessment (CCA) : 50 Marks

Assignments	Test	Attendance
20	20	10

Term End Examination: 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	**Lab**	**Assess**
1	**Matrices and System of Linear Equations** Revision: Elementary operations on matrices, Echelon form of matrix, System of linear equations: Gauss Elimination Method, Gauss –Jordan Elimination Method, L.U. Decomposition Method, Rank of matrix, Row rank, Column rank	08	-	-

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2	**Groups** Definition of binary operation, examples, properties of binary operations Definition of Monoid, semi group, examples, Definition of group and examples, finite and infinite groups, permutation groups, Subgroups Cyclic group, normal subgroup, Products and quotients of groups	11	-	1
3	**Coding** Coding of binary information and error detection Decoding and error correction Public Key Cryptography, Candidate One-way Functions, RSA.	9	-	1

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TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2104**			
Course Category	**Core Computer Science**			
Course Title	**Microprocessor Architecture & Programming**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: :
1. Basic of digital electronics, Basic terms related to Microprocessor

Course Objectives:

1. To understand the structure, function and characteristics of Microprocessor
2. To understand the design of the architecture of 8086 Microprocessor
3. To explain the function of each element of a memory hierarchy, identify and compare different methods for computer I/O.

1. Knowledge Students will get the knowledge of Evolution of Microprocessor.
(ii) Will get the detail knowledge of 8086 Microprocessor.

2. Skills **(i)** Use of programming language constructs in program implementation.
(ii) To be able to apply different logics to solve given problem.

Course Outcomes:

On completion of the course, student will be able to–
1. Students will be able to know program development steps
2. Students will be able to write program using different implementations for the same problem

Course Contents:

1. 8086 Architecture
2. Instruction set of 8086
3. 8086 Assembly Language Programming

Learning Resources:

Reference Books:

1) Microprocessor & interfacing (programming & hardware) Revised Second Edition By Douglas V. Hall Tata McGraw Hill
2) Microprocessor Architecture By B.Ram
3) Microprocessor Architecture ,Interfacing & Programming By Mohammad Raffiqzamman

Web Resources:

www.intel.com
www.pcguide.com/ref/CPU
www.CPU-World.com/Arch/

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Associate Dean

Pedagogy:
Smart boards, Participative learning , Group Discussion , Presentations , etc

Assessment Scheme:

Class Continuous Assessment(CCA): 50Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
30	20	-	-	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**8086 Architecture** Evolution of Microprocessors and types, 8086 Microprocessor, Salient features, Pin descriptions, Architecture of 8086 - Functional Block diagram , Register organization, Concepts of pipelining(5 stage), Memory segmentation, Physical memory addresses generation.	10	-	-
2	**Instruction Set of 8086 Microprocessor** Addressing modes, Data transfer instructions, Arithmetic Instructions, Logical Instructions, Bit manipulation instructions, String Operation Instructions, Program control transfer or branching Instructions, Process control Instructions	10	-	-
3	**8086 Assembly Language Programming** Introduction to Assembly Programming and Assembler Directive Assembly program on Addition, Subtraction, Multiplication and Division Sum of Series Smallest and Largest numbers from array Sorting numbers in Ascending and Descending order Block transfer String Operations - Length, Reverse, Compare, Concatenation, Copy	10	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2109**			
Course Category	**AECC 1**			
Course Title	**English Communication**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**2**	**1**	**-**	**2**

Pre-requisites:

1. Passed 12th / (10+2) / HSC with English subject
2. Two years/Three years Diploma of Board of Technical Education or its equivalent
3. PET Entrance Score

Course Objectives:

1. To develop overall linguistic competence and communicative skills of the students
2. To help the students to understand the basic principles of formal communication.
3. To focus on interactive mode of teaching-learning process

Course Outcomes:

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

1. Students are introduced to develop overall linguistic competence and communicative skills of the students
2. Students are able to understand the basic principles of formal communication.
3. Students are acquainted with interactive mode of teaching-learning process

Course Contents:

1. **Introduction:** Theory of Communication, Types and modes of Communication, Pathways of Communication

2. **Language of Communication:**
   Verbal and Non-verbal (Spoken and Written), Personal, Social and Business
   Barriers and Strategies
   Intra-personal, Inter-personal and Group communication

3. **Grammar**
   Vocabulary: Synonyms, Antonyms, Collocation, Commonly Confused Words, Word Formation
   Tenses
   Types of Sentences and Transformation

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Associate Dean

Learning Resources:

Reference Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Sinha K K (2003), "Business Communication"
4. Enriching Oral and Written Communication in English, Orient Blackswan, 2009
5. Literary Vistas, Orient Blackswan, 2014
6. English for Practical Purposes, Macmillan, 2000
7. Business Correspondence And Report Writing By R.C. Sharma And Krishna Mohan, Tata Mcgraw Hill Education Private Limited New Delhi, 4th Edition.

Pedagogy:

Participative learning, discussions and assignments

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
20	20	10	-	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	-	Assess
1	Introduction	4	-	2
2	Language of Communication	6	-	3
3	Grammar	10	-	5

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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS2201**			
Course Category	**Core Computer Science**			
Course Title	**Data Structure – I**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Basic knowledge of computer programming terminologies
2. Knowledge of C Programming language
3. Introduction to problem solving

Course Objectives:

1. To learn the systematic way of solving problem
2. To understand the different methods of organizing large amount of data
3. To efficiently implement solutions for specific problems

Course Outcomes:

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

1. Students will learn the systematic way of solving problem.
2. Students will understand the different methods of organizing large amount of data
3. Students will get knowledge of stack and queue
4. Students will get knowledge of linked list

Course Contents:

Introduction to data structures : Concept**,** Data type, Data object, ADT, Need & Types of Data Structure

Algorithm analysis: Concepts related with algorithm & complexity.

Stacks : Introduction, Static & Dynamic representation, Operations, Applications of stack

Queues: Introduction, Static & Dynamic representation, Operations, Types of Queue.

Linked List : Introduction, Implementation, Types, Operations and Applications of List

Learning Resources:

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Reference Books:

1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)
2. Data Structures using C --- By ISRD Group (Tata McGraw Hill)
3. Introduction to Data Structures using C---By Ashok Kamthane
4. Data Structures using C --- Bandopadhyay & Dey (Pearson)

Pedagogy: Participative learning, discussions, algorithm, flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to data structures :** Concept**,** Data type, Data object, ADT, Need of Data Structure, Types of Data Structure	5	-	-
2	**Algorithm analysis :** Algorithm – definition, characteristics, Space complexity, time complexity, Asymptotic notation (Big O, Omega)	5	-	-
3	**Stacks :** Introduction, Static & Dynamic Representation, Operations, Application - infix to postfix & prefix, postfix evaluation	5	-	-
4	**Queues :** Introduction, Static & Dynamic Representation, Operations, Circular queue, DeQue, priority queues	5	-	-
5	**Linked List :** Introduction to List, Implementation of List – static & dynamic representation, Types of Linked List, Operations on List, Applications of Linked List – polynomial manipulation	10	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS2202**			
Course Category	**Core Computer Science**			
Course Title	**Object Oriented Concepts using CPP-I**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Fundamentals of Programming Languages
2. Knowledge of C programming

Course Objectives:

1. To explore the principles of Object Oriented Programming (OOP).
2. To understand object-oriented concepts such as data abstraction, encapsulation, Inheritance, dynamic binding, and polymorphism.
3. To use the object-oriented paradigm in program design.
4. To lay a foundation for advanced programming.
5. Provide programming insight using OOP constructs.

Course Outcomes:

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

1. Analyze the strengths of object oriented programming
2. Design and apply OOP principles for effective programming
3. Develop programming application using object oriented programming language C++
4. Percept the utility and applicability of OOP

Course Contents:

1. **Object Oriented concepts :** Introduction to Object Oriented Programming Concepts
2. **Introduction to C++ :** Data types, new operators and keywords, reference variables, Classes & Objects, Managing console I/O, C++ stream classes, Usage of manipulators
3. **Function in C++:** Methods of passing parameters to function, Function overloading and default arguments, Inline function, Static class members, Friend functions
4. **Constructors and Destructor:** Introduction to Constructors, it's types and Destructor
5. **Inheritance:** Types of inheritance with examples, virtual base classes and abstract base classes, virtual functions and pure virtual function

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Associate Dean

Learning Resources:

1. Object Oriented Programming with C++ by Robert Lafore
2. Object Oriented Programming with C++ by E. Balagurusamy
3. Object Oriented Modeling and Design by James Rambough
4. The Complete Reference C++ by Herbert Shildth
5. Let us C++ by – Yashwant Kanitkar

Pedagogy: Participative learning, discussions, algorithm, flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Object oriented concepts :** Object oriented methodology, Features, advantages and Applications of OOPS	2	-	-
	Introduction to C++ : Data types, new operators and keywords, type conversion in C++, Introduction to reference variables, Classes & Objects, Classes & Object specifiers, Defining data members and member functions, Array of objects, Managing console I/O, C++ stream classes, Formatted and unformatted console I/O, Usage of manipulators	8	-	-
3	**Function in C++ :** Call by reference, Return by reference, Function overloading and default arguments, Inline function, Static class members, Friend functions	6	-	-
4	**Constructors and destructor:** Types of constructors, memory allocation (new and delete), usage of destructor	4	-	-
5	**Inheritance:** Types of inheritance with examples, virtual base classes and abstract base classes, constructor and destructor in derived class, virtual functions and pure virtual function	10	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2203**			
Course Category	**Core Computer Science**			
Course Title	**Numerical Techniques**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**2**	**1**	**-**	**2**

Pre-requisites:

1. Students must have knowledge of set theory, Number theory.

Course Objectives:

1. Knowledge (i) To get a relational understanding of mathematical concepts .

2. Skills (i) To translate information presented verbally into Mathematical form

3. Attitude (i) To get confidence to solve problems

Course Outcomes:

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

1. Student will understand basic concepts of Numerical Techniques
2. Students can apply concepts learnt in Numerical Techniques.

Course Contents:

1. Errors

Accuracy of Numbers, Errors

2. Algebraic and Transcendental Equation

False Position Method, Newton-Raphson Method

3. Calculus of Finite Differences

Differences: Properties of Operators, Relation between Operators, , Estimation of Error by Difference Table, Technique to determine the Missing Term.

4. Interpolation with Equal Interval

Newton's Gregory Formula for Forward Interpolation, Newton's Gregory Formula for Backward Interpolation.

5. Interpolation with Unequal Interval

Lagrange's Interpolation Formula, Error in Lagrange's Interpolation Formula, Divided Difference, Newton's Divided Difference Formula

6. Numerical Integration

General Quadrature Formula, Trapezoidal Rule, Simpson's one-Third Rule, Simpson's Three-Eight Rule.

7. Numerical Solution of Ordinary Differential Equation

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Euler's Method, Euler's Modified Method, Runge-Kutta Method.

Learning Resources:

Reference Books:

1. Introductory Methods of Numerical Analysis,(3rd Ed) S.S. Sastry, Prentice Hall of India, 1999.
2. Finite differences and Numerical Analysis by H.C. Saxena, S. Chand and Company.
3. An Introduction to Numerical Analysis by K.E. Atkinson Wiley Publications.
4. Numerical Analysis by Balguruswamy.
5. A textbook of Computer Based Numerical and Statistical Techniques, by A. K. Jaiswal and Anju Khandelwal. New Age International Publichers,

Pedagogy:

Participative learning, discussions, demonstrations, assignment

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Attendance
20	20	10

Term End Examination: 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Errors** Accuracy of Numbers, Errors	2	-	-
2	**Algebraic and Transcendental Equation** False Position Method, Newton-Raphson Method	2	-	-

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3	**Calculus of Finite Differences** Differences: Forward Differences, Backward Differences, Central Differences, Other Differences, Properties of Operators, Relation between Operators, Fundamental Theorem on Differences of polynomial, Estimation of Error by Difference Table, Technique to determine the Missing Term.	6	-	1
4	**Interpolation with Equal Interval** Newton's Gregory Formula for Forward Interpolation, Newton's Gregory Formula for Backward Interpolation.	4	-	-
5	**Interpolation with Unequal Interval** Lagrange's Interpolation Formula, Error in Lagrange's Interpolation Formula, Divided Difference, Newton's Divided Difference Formula	5	-	-
6	**Numerical Integration** General Quadrature Formula, Trapezoidal Rule, Simpson's one-Third Rule, Simpson's Three-Eight Rule.	4	-	1
7	**Numerical Solution of Ordinary Differential Equation** Euler's Method, Euler's Modified Method, Runge-Kutta Method.	5	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2204**			
Course Category	**Core Computer Science**			
Course Title	**Introduction to Microcontroller & Communication**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: :

1. Principle of analog electronics
2. Principles of digital electronics
3. Advanced digital electronics

Course Objectives:

- To understand the difference between microprocessor & microcontroller
- To get familiar with communication system
- To understand GSM & CDMA concept
- To understand need of electronic communication

1. Knowledge (i) electronic communication system
(ii) working of smart phones

2. Skills (i) hands on experience on antenna
(ii) GSM & CDMA difference

Course Outcomes:

1. use of microcontroller
2. difference between microprocessor & microcontroller
3. Understand electronic communication system
4. Working of GSM & CDMA
5. Learning the ways of data transmission

Course Contents:

Introduction to Microcontroller
Registers & interrupts
Electronic Communication
Multiplexing & Multiple Access

Learning Resources:

Reference Books:

1) 8051 microcontroller : K. Ayala Pearson

1) Communication electronics : Louis E. Frenzel, Mc Graw Hill

2) Electronic Communication System: George Kennedy Tata McGraw-Hill

Supplementary Reading:

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Antenna theory analysis & design by balanis wiley publication
Web Resources: nokia mobile GSM architecture pdf

Weblinks:
http://www.iaeme.com/Ijecet/index.asp

Pedagogy:
Participative learning, discussions , demonstrations, practical, assignments etc

Assessment Scheme:

Class Continuous Assessment(CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
30	10	10				

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to Microcontroller:**- Difference between Microprocessor & Microcontroller, Features of 8051 , Block diagram of 8051 , Pinout of 8051	5	-	-
2	**Registers & interrupts**:- 8051 Timers , structure of TCON , TMOD , serial communication , structure of SCON , PCON , Interrupts of 8051 , structure of IE & IP	10	-	-
3	**Electronic Communication**:- Block diagram of electronic communication system, communication channel and their characteristics, baseband &bandpass signals. Modulation & Demodulation , types of modulation & demodulation, Hamming code	8	-	-
4	**Multiplexing &Multiple Access:** - Multiplexing, TDM, FDM & CDM & Multiple Access Techniques TDMA, FDMA, CDMA, introduction to GSM	7	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2209**			
Course Category	**AECC II**			
Course Title	**English Communication**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**2**	**1**	**-**	**2**

Pre-requisites:

1. Passed 12th / (10+2) / HSC with English subject
2. Two years/Three years Diploma of Board of Technical Education or its equivalent
3. PET Entrance Score

Course Objectives:

1. To develop overall linguistic competence and communicative skills of the students
2. To help the students to understand the basic principles of formal communication.
3. To focus on interactive mode of teaching-learning process

Course Outcomes:

1. Students are introduced to develop overall linguistic competence and communicative skills of the students
2. Students are able to understand the basic principles of formal communication.
3. Students are acquainted with interactive mode of teaching-learning process

Course Contents:

1. **Speaking Skills:**
   Monologue and Dialogue
   Group Discussion
   Effective Communication/ Mis- Communication
   Interview; Public Speech

2. **Writing Skills**
   Paragraph Writing
   Summary Writing
   Letter writing
   Report Writing
   Review Writing
   Presentations

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Learning Resources:

Reference Books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Sinha K K (2003), "Business Communication"
4. Enriching Oral and Written Communication in English, Orient Blackswan, 2009
5. Literary Vistas, Orient Blackswan, 2014
6. English for Practical Purposes, Macmillan, 2000
7. Business Correspondence And Report Writing By R.C. Sharma And Krishna Mohan, Tata Mcgraw Hill Education Private Limited New Delhi, 4th Edition.

Pedagogy:

Participative learning, discussions and assignments

Assessment Scheme:

Class Continuous Assessment (CCA):50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
20	20	10	-	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	-	Assess
1	Speaking Skills	8	-	4
2	Writing Skills	12	-	6

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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS2301**			
Course Category	**Core Computer Science**			
Course Title	**Data Structure – II**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of C Programming language
2. Knowledge of algorithm and algorithm analysis
3. Knowledge of stack and queue
4. Knowledge of linked list

Course Objectives:

1. To efficiently implement the different data structures
2. To learn the systematic way of solving problem
3. To efficiently implement the linear data structures
4. To understand the different methods of organizing large amount of data
5. To efficiently implement solutions for specific problems

Course Outcomes:

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

1. Students will learn the systematic way of solving problem
2. Students will understand the different methods of organizing large amount of data
3. Students will get knowledge of linear data structures, tree and graph
4. Students will get knowledge of hash table and overflow handling techniques

Course Contents:

Searching and Sorting Techniques : Introduction to Arrays, Searching types, Sorting types

Trees : Concept & Terminologies, Binary tree, binary search tree, Static and dynamic representation, Operations on BST, Application - Heap sort, Height balance tree- AVL trees- Rotations

Graph : Concept & terminologies, Graph Representation, Traversals, Applications

Hashing :

Hash table concepts, Hash functions, Overflow handling techniques

Learning Resources:

Reference Books:

1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)
2. Data Structures using C --- By ISRD Group (Tata McGraw Hill)
3. Introduction to Data Structures using C---By Ashok Kamthane
4. Data Structures using C --- Bandopadhyay & Dey (Pearson)

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Pedagogy: Participative learning, discussions, algorithm, flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Searching and Sorting Techniques:** Introduction to Arrays - array representation, Searching types -Linear Search, Binary Search, Sorting types - Bubble sort, Selection sort, Insertion sort, Merge sort, Quick Sort	10	-	-
2	**Trees:** Concept & Terminologies, Binary tree, binary search tree, Representation –static & dynamic, Operations on BST – create. Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes, Application - Heap sort Height balance tree- AVL trees- Rotations	8	-	-
3	**Graph :** Concept & terminologies, Graph Representation, Traversals – BFS & DFS, Applications – AOV network – topological sort, AOE network – critical path, Shortest path with implementation	7	-	-
4	**Hashing :** Hash table concepts, Hash functions, Overflow handling techniques [No Programming implementation]	5	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS2302**			
Course Category	**Core Computer Science**			
Course Title	**Object Oriented Concepts using CPP-II**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Fundamentals of Programming Languages
2. Knowledge of C programming Language
3. Basic object oriented concepts.
4.

Course Objectives:

1. To explore the principles of Object Oriented Programming (OOP).
2. To understand object-oriented concepts such as data abstraction, encapsulation, Inheritance, dynamic binding, and polymorphism.
3. To use the object-oriented paradigm in program design.
4. To lay a foundation for advanced programming.
5. Provide programming insight using OOP constructs.

Course Outcomes:

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

1. Analyze the strengths of object oriented programming
2. Design and apply OOP principles for effective programming
3. Develop programming application using object oriented programming language C++
4. Percept the utility and applicability of OOP
5.

Course Contents:

1. **Operator overloading:** Introduction to Operator Overloading with examples.
2. **File handling:** File system basics, Streams I/O Library, File pointers and their manipulations
3. **Exception Handling in C++:** Introduction to exception and techniques to handle exceptions
4. **Templates:** Introduction to templates and its types

Learning Resources:

1. Object Oriented Programming with C++ by Robert Lafore
2. Object Oriented Programming with C++ by E. Balagurusamy
3. Object Oriented Modeling and Design by James Rambough
4. The Complete Reference C++ by Herbert Shildth
5. Let us C++ by – Yashwant Kanitkar

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Pedagogy: Participative learning, discussions, algorithm, flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Operator overloading:** Overloading unary and binary operators, overloading using friend function, usage of this pointer, overloading insertion and extraction operator	8	-	-
2	**File handling:** File system basics, the standard streams, Streams I/O Library, Formatted Stream I/O, File I/O, Unformatted and Binary I/O, File pointers and their manipulations, Random access.	8	-	-
3	**Exception Handling in C++:** Fundamentals, other error handling techniques, simple exception handling Divide by Zero, rethrowing an exception, exception specifications, processing unexpected exceptions	7	-	-
4	**Templates:** Introduction to templates, Class templates, function templates and overloading of function templates, With multiple parameters, CASE study on STL (with reference to container classes, operational utilities)	7	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2303**			
Course Category	**Core Computer Science**			
Course Title	**Computational Geometry**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**2**	**1**	**-**	**2**

Pre-requisites:

1. Students must have knowledge of Matrix operation.

Course Objectives:

1. Knowledge (i) To get a relational understanding of mathematical concepts .

2. Skills (i) To translate information presented verbally into Mathematical form

3. Attitude (i) To get confidence to solve problems

Course Outcomes:

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

1. Student will understand basic concepts of Computational Geometry
2. Students can apply concepts learnt in Computational Geometry

Course Contents:

1. Two dimensional transformations

Introduction. Representation of points. Transformations and matrices. Transformation of points. Transformation of straight lines. Midpoint transformation. Transformation of parallel lines. Transformation of intersecting lines. Transformation: rotations, reflections, scaling, shearing. Combined transformations. Transformation of a unit square. Solid body transformations. Transformation and homogeneous coordinates. Translation. Rotation about an arbitrary point. Reflection through an arbitrary line. Projection – a geometric interpretation of homogeneous Coordinates. Overall Scaling. Point at infinity.

2. Three dimensional transformations

Introduction. Three dimensional – Scaling, shearing, rotation, reflection, translation. Multiple transformations. Rotation about – an axis parallel to coordinate axes, an arbitrary axis in Space. Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary Planes. Affine and perspective transformations. Orthographic projections. Axonometric projections. Oblique projections. Single point perspective transformations. Vanishing points.

3. Plane Curves

Introduction. Curve representation. Non – parametric curves. Parametric curves.Parametric representation of a circle and generation of circle. Parametric representation of an ellipse and

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Associate Dean

generation of ellipse. Parametric representation of a parabola and generation of parabolic Segment. Parametric representation of a hyperbola and generation of hyperbolic segment.

4. Space curves

Bezier Curves – Introduction, definition, properties (without proof),
Curve fitting (up to n = 3), equation of the curve in matrix form (upto n = 3)

Learning Resources:

Reference Books:

1. Schaum Series, Computer Graphics.
2. M. E. Mortenson, Computer Graphics Handbook.
3. D. F. Rogers, J. A. Adams, Mathematical elements for Computer graphics, Mc Graw Hill Intnl Edition.

Pedagogy:

Participative learning, discussions, demonstrations, assignment

Assessment Scheme:

Class Continuous Assessment (CCA) 50 Marks

Assignments	Test	Attendance
20	20	10

Term End Examination: 50 Marks

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Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
	Two dimensional transformations Introduction. Representation of points. Transformations and matrices. Transformation of points. Transformation of straight lines. Midpoint transformation. Transformation of parallel lines. Transformation of intersecting lines. Transformation: rotations, reflections, scaling, shearing. Combined transformations. Transformation of a unit square. Solid body transformations. Transformation and homogeneous coordinates. Translation. Rotation about an arbitrary point. Reflection through an arbitrary line. Projection – a geometric interpretation of homogeneous coordinates. Overall Scaling. Point at infinity.	11	-	1
2	**Three dimensional transformations** Introduction. Three dimensional – Scaling, shearing, rotation, reflection, translation. Multiple transformations. Rotation about – an axis parallel to coordinate axes, an arbitrary axis in space. Reflection through – coordinate planes, planes parallel to coordinate planes, arbitrary planes. Affine and perspective transformations. Orthographic projections. Axonometric projections. Oblique projections. Single point perspective transformations.	10	-	-

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	Vanishing points.			
3	**Plane Curves** Introduction. Curve representation. Non – parametric curves. Parametric curves. Parametric representation of a circle and generation of circle. Parametric representation of an ellipse and generation of ellipse. Parametric representation of a parabola and generation of Parabolic Segment. Parametric representation of a hyperbola and generation of hyperbolic segment.	5	-	1
4	**Space curves** Bezier Curves – Introduction, definition, properties (without proof), Curve fitting (up to n = 3), equation of the curve in matrix form (upto n = 3)	2	-	-

Prepared By	**Checked By**	**Approved By**
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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS2304**			
Course Category	**Core Computer Science**			
Course Title	**Computer Organizations**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Basics of digital electronics, basics of analog electronics.

Course Objectives:

1. To understand the structure, function and characteristics of computer systems.
2. To understand the design of the various functional units and components of digital computer
3. To explain the function of each element of a memory hierarchy, identify and compare different methods for computer I/O.
4. To compare simple computer architectures and organizations based on established.
5. To understand the use, terminology, and potential of the Arduino microcontroller.

1. Knowledge: (i) Characteristics of computer systems.
(ii) Computer architectures and organizations

2. Skills: (i) Technical and practical skills.
(ii) Soft sklills

Course Outcomes:

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

1. Demonstrate computer architecture concepts related to design of modern processors, memories and I/Os.
2. Analyze the principles of computer architecture using examples drawn from commercially available computers.
3. Evaluate various design alternatives in processor organization
4. Familiarize students with the Raspberry Pi features and uses .Familiarize students with basic programming concepts using Python on the RPi.
5. Study Arduino microcontroller and understand the Arduino programming model

Course Contents:

1. CPU Organization
2. Memory organization.
3. I/O Organization
4. Introduction to Arduino Microcontroller
5. Introduction to Raspberry Pi

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Learning Resources:

Reference Books:

1. Electronic Principles, Tata McGraw-Hill, 7th Edition by Albert Malvino and David Bates
2. Arduino Microcontroller: Processing for Everyone! , By Steven F. Barrett
3. Programming the Raspberry pi Raspberry Pi getting started with Python : by Simon Monk
4. Digital Logic & Computer Design, Mano, ISBN:9788177584097, Pearson
5. Computer Systems Organization & Architecture- John D. Carinelli Pearson publication.
6. Digital Design and Computer Architecture 2nd Edition , Harris, Morgan Kauffman Publishers(Elesevier) ISBN:9789382291527

Web Resources:

1. nptel.ac.in/
2. epgp.inflibnet.ac.in/
3. https://www.arduino.cc

Pedagogy:

Participative learning, discussions, demonstrations, case studies, practical, assignments etc.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Any other
30	20	-	-	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**CPU Organization** Functions of CPU , General registers used in CPU -PC, SP, instruction pointer, instruction register, instruction decoder, flag, general purpose registers, memory address register, memory byte register Concept of stack, instructions used with stack. Block diagram of ALU, Concept of RISC and CISC.	6	-	-
2	**Memory organization.** Concept of Memory, types of memory, parameters of memory, Memory hirechary, Memory expansion (capacity and word size),	8	-	-

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	Concept of cache memory, Cache memory mapping techniques (Associative, Direct and Set Associative)			
3	**I/O Organization**: Interfacing concept and need, general structure of an interface, block diagram of parallel interface and function of blocks, Concept of interrupt, Types of I/O transfer, CPU initiated, interrupt initiated, DMA (only concept),Working of UART with block diagram	8	-	-
4	**Introduction to Arduino Microcontroller**: Arduino Hardware, Programming Concepts, Introduction to the Arduino IDE Mapping Input to Output, Developing a Project Idea.	4	-	-
5	**Introduction to Raspberry Pi :** Introduction to Raspberry Pi board, Introduction to python programming environment, Linux basics, I/O interface, shell programming.	4	-	-

Prepared By	**Checked By**	**Approved By**
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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS3101**			
Course Category	**Core Computer Science**			
Course Title	**Operating System**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Basic knowledge of hardware and software aspects of computer systems organization

Course Objectives:

1. To understand basic concepts of operating system as well as system calls
2. To understand concept of Process management and Process scheduling
3. To understand Deadlock and Memory management

Course Outcomes:

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

1. Detailed understanding of Operating system concepts.

Course Contents:

Introduction to Operating System and System structure
Introduction and Definition of Operating System, Types of Operating System
Process Management
Process Concept, Process State, Process control block
Process Scheduling
Basic concept , Scheduling criteria
Process Synchronization
Introduction , Critical Section problem, Semaphores Usage and Implementation
Multithreaded Programming
Overview, Thread libraries, Multithreading models
Memory Management
Dynamic loading, Swapping, Contiguous memory allocation -MFT
Deadlock
Introduction , Deadlock Characterization, Methods for handling deadlock

Learning Resources:

Reference Books:

1. Operating System Concepts-Siberchatz, Galvin, Gagne (8th Edition)
2. Operating Systems: Principles and Design- Pabitra Pal Choudhary (PHI Learning Private Limited)
3. Operating systems design and implementation, Andrew s. Tanenbaum, Prentice-Hall.

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Pedagogy: Participative learning, discussions, algorithm, Flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Unit 1: Introduction to Operating System and System structure** Introduction and Definition of Operating System, Types of Operating System, Open Source Operating System, Operating system services, User operating system interface System calls, Overview of types of System call, Process control system call- fork(),exec(), Operating System structure	2	-	-
2	**Unit 2: Process Management** Process Concept, Process State , Process control block, Context switch, Operation on process-Process creation and termination Interprocess Communication	3	-	-
3	**Unit 3: Process Scheduling** Basic concept , Scheduling criteria , Scheduling Algorithms: (FCFS,SJF, Priority, Round Robin, Multiple queue and Multilevel feedback queue)	5	-	-
4	**Unit 5: Process Synchronization** Introduction , Critical Section problem, Semaphores Usage and Implementation, Classic problem of synchronization -Bounded buffer, -Reader Writer, - Dining Philosopher problem	4	-	-
5	**Unit 4: Multithreaded Programming** Overview, Thread libraries, Multithreading models	1	-	-

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6	**Unit 7: Memory Management** Introduction, Address binding, logical versus physical address, Static and Dynamic linking, Dynamic loading, Swapping Contiguous memory allocation –MFT, -MVT, Non Contiguous allocation-Paging, - Segmentation Virtual Memory management- Demand Paging, Page Replacement Algorithm (FIFO, Optimal ,LRU, Second chance)	9	-	-
7	**Unit 6: Deadlock** Introduction , Deadlock Characterization, Methods for handling deadlock Resource Allocation graph, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection Recovery from deadlock	6		

Prepared By	**Checked By**	**Approved By**
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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS3102**			
Course Category	**Core Computer Science**			
Course Title	**Programming in Java – I**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of C or C++ Programming Language

Course Objectives:

Students will learn how to

1. Write, compile and execute Java programs.
2. Build robust applications using Java's object-oriented features.
3. Create robust applications using Java class libraries.
4. Develop platform-independent GUIs.
5. Read and write data using Java streams.

Course Outcomes:

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

1. Design, create, build, and debug Java applications and applets.
2. Apply algorithmic thinking to solve programming problems.
3. Implement syntax rules in Java programs.
4. Write and apply decision structures for determining different operations.
5. Write Java programs using object-oriented programming techniques including classes, objects, methods, instance variables, composition, and polymorphism.

Course Contents:

INTRODUCTION TO JAVA – Introduction, advantages, basic concepts and data types.

OBJECTS AND CLASSES - Concepts of objects and classes.

FUNCTIONS IN JAVA – Use of strings, date and time functions.

EXCEPTION HANDELING – Dealing with exceptions and handing.

STREAMS & FILES- Complete stream family and handling files.

Learning Resources:

Reference Books:

1. Complete reference Java by Herbert Schildt(5th edition)
2. Java 2 programming black books, Steven Horlzner
3. Programming with Java , A primer , Fourth edition , By E. Balagurusamy

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Pedagogy: Participative learning, discussions, algorithm, flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**INTRODUCTION TO JAVA** Java as programming tool, Advantages of Java - Simple, object oriented Distributed, Robust, Secure, Architecture neutral, Portable, Interpreted, High Performance, Multithreading, dynamic. Java and Internet, Variables, Data Types, Operators, Arrays, Casting, Compiling and running java program, Command line arguments.	5	-	-
2	**OBJECTS AND CLASSES** Introduction - Classes, Objects, Data members, methods, Use of existing classes, Types of Constructors, Overloading, Packages.	5	-	-
3	**FUNCTIONS IN JAVA** String functions - Concatenation, Substring, String editing, Testing for Equality, character extraction function – CharAt, getChars, getByte , Formatting functions, Date and Time functions using Gregorian Calendar Class.	5	-	-
4	**EXCEPTION HANDELING** Dealing with errors, Types of exceptions, How to throw the Exception, Catching Exceptions.	7	-	-
5	**STREAMS & FILES** Streams, The complete stream family - Layering stream files, Data stream, random access file stream, Putting stream to use - writing delimited output, String Tokenizers & delimited input, Object streams.	8		

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3103**			
Course Category	**Core Computer Science**			
Course Title	**Internet Programming using PHP-I**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of HTML

Course Objectives:

1. Introducing students to the web browser and web server
2. To understand language basics and lexical structure of PHP
3. To understand designing a web page with the help of HTML, CSS and how to parse values to the PHP script.
4. To understand how database connectivity done through PHP script.

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

1. Describe the Built in functions of PHP
2. Apply PHP best practices
3. Use the DOM / Interactivity with elements

Course Contents:

1. Introduction to PHP – Evaluation, capturing data, generating file
2. Function & String – Functions and Strings
3. Working with Array – Using array and array functions
4. Introduction to Object Oriented Programming – Constructor, destructor, access methods and inheritance
5. Working with file and Directories – using file methods

Learning Resources:

Reference Books:

1. Programming PHP by Rasmus Lerdorf and Kevin Tatroe, O'Reilly publication
2. Beginning PHP 5,Wrox publication
3. AJAX Black Book, Kogent solution
4. Mastering PHP, BPB Publication

Web Resources:

1. www.php.net.in
2. www.W3schools.com
3. www.wrox.com

Pedagogy: Participative learning, discussions, Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

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Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	10	10		-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to PHP** Evaluation of PHP, Language Basics (Defining variable and constant, Data type, Operator and Expression, Decisions & Loops), Capturing Form Data, Dealing with Multi-value filed, Generating File uploaded form, redirecting a form after submission.	6	-	-
2	**Function & String** What is a function, Define a function, Call by value and Call by reference?, Variable function, Anonymous function, Recursive function , Creating and accessing String, Searching & Replacing String, Formatting String, Regular expression &Pattern matching in Php, Splitting a string with a Regular Expression, String Related Library function.	6	-	-
3	**Working with Array** Anatomy of an Array, Creating index based and Associative array, Accessing array Element, Looping with Index based array, Looping with associative array using each() and foreach() Some useful Library function.	6	-	-
4	**Introduction to Object Oriented Programming** Introduction, The new keyword and constructor, Destructor, Access method and properties using $this variable, Public, private, protected properties and methods, Static properties and method, Inheritance & code reusability, Parent::& self:: keyword, Instance of operator, Abstract method and class, Interface, Final	6	-	-
5	**Working with file and Directories** Understanding file& directory, Opening and closing a file, Copying, renaming and deleting a file working with directories, File Uploading & Downloading. Introduction to PHP	6	-	-

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Dr. Vishwanath Karad
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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS3106B**			
Course Category	**Elective**			
Course Title	**Compiler Construction**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Basic understanding of programming language.

Course Objectives:

1. To gain an understanding of compiler, its phases in detail like Lexical, Syntax
2. To understand code generation and code optimization

Course Outcomes:

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

1. Detailed understanding of compiler and its different phases.

Course Contents:

Introduction of Compiler

Definition of Compiler, structure of Compiler, Phases of Compiler

Lexical Analysis

Lexical analyzer, searching using RE, Input buffering

Syntax Analysis

Definition, Types of Parsers, Top-Down Parser:Top-Down Parsing with Backtracking: Method & Problems

Semantic Analysis

Syntax Directed Definition, Inherited & Synthesized Attributes

Code Generation and Optimization

Compilation of expression– Concepts of operand descriptors and register descriptors with example

Learning Resources:

Reference Books:

1. Compilers: Principles, Techniques, and Tools ,Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman
2. Principles of Compiler Design By : Alfred V. Aho, Jeffrey D. Ullman (Narosa Publication House)
3. LEX & YACC (O'reilly Publication)

Pedagogy: Participative learning, discussions, algorithm, Flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

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Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Unit 1: Introduction of Compiler** Definition of Compiler, structure of Compiler, Phases of Compiler, Error Handling, Introduction to one pass & Multipass compilers, cross compiler, Bootstrapping.	2	-	-
2	**Unit2: Lexical Analysis** Lexical analyzer, searching using RE, Input buffering, Recognition of tokens LEX: A Lexical analyzer generator-Simple Lex Programs	2	-	-
3	**Unit 3: Syntax Analysis** Definition, Types of Parsers Top-Down Parser: Top-Down Parsing with Backtracking: Method & Problems Drawbacks of Top-Down parsing with backtracking, Elimination of Left Recursion (direct & indirect) Need for Left Factoring with examples Recursive Descent Parsing: Definition, Implementation of Recursive Descent Parser Using Recursive Procedures Predictive Parser- Definition, Implementation of Predictive Parser, FIRST & FOLLOW, Construction of LL (1) Parsing Table, Parsing of a String using LL (1) Table Bottom-Up Parsers, Operator Precedence Parser- Operator Precedence Relations form Associativity & Precedence Operator Precedence Grammar, Algorithm for LEADING & TRAILING with examples, Algorithm for Operator Precedence Parsing with examples, Precedence Functions Shift Reduce Parser- Reduction, Handle, Handle Pruning Stack Implementation of Shift Reduce Parser with examples LR Parser-Types [SLR, Canonical LR, LALR] Method & examples.	18	-	-
4	**Unit 4: Semantic Analysis** Syntax Directed Definition, Inherited & Synthesized Attributes Evaluating an SDD at the nodes of a Parse Tree Evaluation Orders for SDD's, Dependency Graph Ordering the Evaluation of Attributes, S-Attributed Definition L-Attributed Definition	4	-	-

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5	**Unit 5: Code Generation and Optimization** Compilation of expression– Concepts of operand descriptors and register descriptors with example. Intermediate code for expressions –postfix notations, triples and quadruples, expression trees. Code Optimization – Optimizing transformations– compile time evaluation, elimination of common sub expressions, dead code elimination, frequency reduction, strength reduction	4	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3106C**			
Course Category	**Elective**			
Course Title	**Computer Graphics**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Linear Algebra
2. Programming in C
3. Data structures using c

Course Objectives:

1. To study how graphics objects are represented in Computer
2. To study how graphics system in a computer supports presentation of graphics information
3. To study how interaction is handled in a graphics system
4. To study how to manipulate graphics object by applying different transformations
5. To provide the programmer's perspective of working of computer graphics

Course Outcomes:

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

1. Get the knowledge of graphics objects that are represented in Computer.
2. Understand graphics system in a computer supports presentation of graphics information, how interaction is handled in a graphics system.
3. Manipulate graphics object by applying different transformations.

Course Contents

Introduction to Computer graphics

Introduction to computer graphics & graphics systems. What are components of Computer Graphics Representation? What are Uses of Computer Graphics?

Point, Line and Polygon primitives

Scan conversions. Run length encoding. Line drawing algorithms; -DDA algorithm, Brenham's line algorithm, Circle generation algorithm. Scan converting polygons. Fill algorithms- Boundary fill algorithm, flood fill algorithm

2D & 3D Transformations and viewing

How is Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline. Window to viewport co-ordinate transformation

Clipping Algorithm

Various clipping algorithms are discussed

Introduction to OpenGL

What is OpenGL?

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Coordinate Systems & Frame Concept
The OpenGL Rendering Pipeline

Learning Resources:

Reference Books:

1. Hearn, Baker - " Computer Graphics (C version 2nd Ed.) "-Pearson education
2. F. S. Hill, Stephen Kelly, Computer Graphics using OpenGL, PHI Learning
3. David F. Rogers-Pro cedural Elements of Computer Graphics, Tata McGRAw Hill
4. Foley, Vandam, Feiner, Hughes –"Computer Graphics principles" (2nd Ed.) –Pearson Education.
5. W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics"– TMH.
6.D. F. Rogers, J. A. Adams, " Mathematical Elements for Computer Graphics (2nd Ed.)",TMH
7. Z. Xiang, R. Plastock –" Schaum's outlines Computer Graphics (2nd Ed.)" – TMH

Pedagogy:

Participative learning, discussions, algorithm, Flowchart & Program writing, Practical, assignment, Power Point presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Attendance	Viva	Presentation	Any other
10	10	10	10	10	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to Computer graphics** Introduction to computer graphics Four components of Computer Graphics Representation Graphics Primitives – Pixel/Point, Raster v/s Vector RGB color model	5	-	-
2	**Point, Line and Polygon primitives** Scan conversions Line drawing algorithms; - DDA algorithm	5	-	-

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	Polygons Fill algorithms- Boundary fill algorithm, flood fill algorithm			
3	**2D & 3D Transformations and viewing** Basic Transformations – Scaling, Rotation, Reflection, Translation Matrix representations & homogeneous coordinates Viewing pipeline Window to viewport co-ordinate transformation Parallel and Perspective projections	6	-	-
4	**Clipping Algorithms** Clipping operations Point clipping Line clipping - Cohen Sutherland algorithm, Midpoint subdivision algorithm Polygon clipping - Sutherland Hodgman algorithm, Weiler-Atherton Algorithm	6	-	-
5	**Introduction to OpenGL** What is OpenGL? Drawing in 3D Space A Short Recapitulation of Linear Coordinate Systems & Frame Concept The OpenGL Rendering Pipeline OpenGL API The OpenGL Shading language	8	-	-

Prepared By	**Checked By**	**Approved By**
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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3107B**			
Course Category	**Core Computer Science**			
Course Title	**Software Project Management**			
Teaching Scheme and Credits Weekly load hrs	**L**	**T**	**Laboratory**	**Credits**
	3	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of Software Engineering
2. Basics of Software Testing

Course Objectives:

1. Software Metrics and Project Management covers skills that are required to ensure successful medium and large scale software projects.
2. It examines Requirements Elicitation, Project Management, Verification and Validation and Management of Large Software Engineering Projects.
3. Student learn to select and apply project management techniques for process modeling, planning, estimation, process metrics and risk management; perform software Verification and validation using inspections, design and execution of system test cases.
4. Students get the brief idea about software testing.

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

1. Gain enough knowledge to create and publish their own Apps for Google Android devices
2. Learn advanced topics through self study methods.

Course Contents:

Project management:
Intro of Project Management Process. What are the various roles of project manager

Software Metrics

Introduction to COCOMO Model and Role of software Metrics

Project Management Areas
Covers different types of managements involved in the development of software

Changing Trends in Software Development
Focuses on the Agile development and design

Learning Resources:

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Reference Books

1. System Analysis & Design – Satzinger, Jackson,Burd,Cengage Learning, India.
2. Software Engineering- A Practitioner's Approach, McGraw Hill Int.
3. Integrated Approach to Software Engineering - Pankaj Jalote (Narosa)

Supplementary Reading:

1. Design Patterns – Elements of Reusable Object-Oriented Software, Pearson By – Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,
2. Software Engineering: WamanJawadekar, TMH
3. Software Engineering :Sommerville, Pearson Education

Pedagogy:

Participative learning, discussions, algorithm, Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ
10	10	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Project management** Intro of Project Management Process Role of Project Manager, Project Management Knowledge Areas, Managing Changes in requirements	05	-	-
2	**Software Metrics** Role of software Metrics Size & Effort Estimation: Concepts of LOC & Estimation, Function Point, COCOMO Model, Concept of Effort Estimation & Uncertainty	06	-	-

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	Project Scheduling: Building WBS, Use of Gantt & ZERT/CPM chart			
3	**Project Management Areas** Cost Management - Cost estimation and Control Quality Management - Quality planning and assurance Human Resource Management - Organizational planning, Staff acquisition Communication Management - Information distribution, Reporting Risk Management - Risk identification, Quantification and control Procurement Management – Solicitation, Contract administration Management of OO software Projects - Object oriented metrics, UseCase estimation, selecting development tools Quality Standards - CMM , PSP/TSP	11	-	1
4	**Changing Trends in Software Development** Unified Process, Its phases & disciplines, Agile Development – Principles & Practices, Extreme programming- Core values & Practices Frameworks, Components, Services, Introduction to Design Patterns, Open Source	06	-	1

Prepared By	**Checked By**	**Approved By**
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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3107C**			
Course Category	**Elective**			
Course Title	**Internet Of Things**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of networking, sensing, databases, programming, and related technology.
2. Familiarity with business concepts and marketing.

Course Objectives:

1. Vision and Introduction to IoT.
2. Understand IoT Market perspective.
3. Data and Knowledge Management and use of Devices in IoT Technology.
4. Understand State of the Art – IoT Architecture.
5. Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Course Outcomes:

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

1. Students will understand IoT Market perspective.
2. Students will get Data and Knowledge Management and use of Devices in IoT Technology.
3. Students will understand State of the Art – IoT Architecture.
4. Students will get Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Course Contents:

M2M to IoT
Introduction of M2M to IoT
M2M to IoT – A Market Perspective
Introduce basic concepts of IoT. Emerging industrial structure for IoT and development of IoT architecture.
M2M and IoT Technology Fundamentals
Fundamental concepts of technology required for M2M and IoT
IoT Architecture-State of the Art
Includes study of IoT reference model.
IoT Reference Architecture
Study of different views of reference architecture. Introduction to Industrial Automation- Service-oriented architecture-based device integration
Commercial Building Automation
Case study for Commercial Building Automation.

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Learning Resources:

Reference Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.Data Warehousing in the Real World, Anahory, Murray, Pearson Education
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

Supplementary Reading:

1. Collaborative Internet of Things (C-IoT): For Future Smart Connected Life and Business
2. By Fawzi Behmann, Kwok Wu

Weblinks:

www.tutorialspoint.com

Pedagogy:

Participative learning, discussions, Problem Solving, experiential learning through practical problem solving, assignment, PowerPoint presentation

Assessment Scheme:

Class Continuous Assessment - 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	-	10	10	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**M2M to IoT** The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics	3	-	-
2	**M2M to IoT – A Market Perspective** Introduction, Some Definitions, M2M Value Chains, IoT Value	5	-	-

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	Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations			
3	**M2M and IoT Technology Fundamentals** Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management	5	-	-
4	**IoT Architecture-State of the Art** Introduction, State of the art, Architecture Reference Model-Introduction, Reference Model and architecture, IoT reference Model	4	-	-
5	**IoT Reference Architecture** Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. Industrial Automation- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things	8	-	-
6	**Commercial Building Automation** Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future	5	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS3201**			
Course Category	**Core Computer Science**			
Course Title	**Theoretical Computer Science**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Basic understanding of mathematical concepts.

Course Objectives:

1. To understand concept of Regular languages and Finite Automata
2. To understand concepts of Context free languages and Pushdown Automata
3. To understand concepts of Turing Machine

Course Outcomes:

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

1. functioning, capabilities, computability, complexity as well as the limitations of different mathematical models

Course Contents:

Introduction

Symbol, Alphabet, String, Prefix & Suffix of Strings

Regular Expression, Regular Language and Finite Automata

Regular expression: Definition & Example, Regular Expressions Identities.

Context Free Grammar and Languages

Grammar-Definition and Examples, Derivation, Reduction, Definition and Examples.

Push Down Automaton

Definition of PDA and examples, Construction of PDA using empty stack and final State method

Turing Machine

Model and Definition of TM, Design of Turing Machines

Learning Resources:

Reference Books:

1. Introduction to Automata theory, Languages and computation By John E. Hopcroft and Jeffrey Ullman –Narosa Publishing House.
2. Theory of Computer Science (Automata, Language & Computation) K. L. P. Mishra & N. Chandrasekaran, PHI Second Edition
3. Introduction to Automata theory, Languages and computation By John Hopcroft, Rajeev Motwani and Jeffrey Ullman –Third edition Pearson Education

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Pedagogy: Participative learning, discussions, algorithm, Flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Unit 1: Introduction** Symbol, Alphabet, String, Prefix & Suffix of Strings, Formal Language, Operations on Languages.	1	-	-
2	**Unit 2: Regular Expression, Regular Language and Finite Automata** Regular expression: Definition & Example Regular Expressions Identities. Finite Automata Deterministic finite Automaton -Definition, DFA as language recognizer, DFA as a pattern recognizer. Nondeterministic finite automaton- Definition and Examples. NFA TO DFA NFA with ε-transitions- Definition and Examples. NFA with ε-Transitions to DFA & Examples Finite automaton with output-Mealy and Moore machine, Definition and Examples Minimization of DFA-Algorithm & Problem using Table Method. Regular Languages-Definition and Examples. Conversion of RE To FA-Examples. Pumping lemma for regular languages and applications. Closure properties of regular Languages (Union, Concatenation, Complement, Intersection and Kleene closure)	9	-	-

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3	**Unit 3: Context Free Grammar and Languages** Grammar-Definition and Examples Derivation, Reduction, Definition and Examples. Chomsky Hierarchy. CFG- Definition & Examples. LMD, RMD, ,Parse Tree Ambiguous Grammar- Concept & Examples. Simplification of CFG : Removing Useless Symbols, Removing unit productions Removing ϵ productions & Nullable symbols Normal Forms: Chomsky Normal Form (CNF) Method & Problem Greibach Normal form (GNF) Method & Problem Regular Grammar: Definition Left linear and Right Linear Grammar-Definition and Example. Equivalence of FA & Regular Grammar Construction of regular grammar equivalent to a given DFA Construction of a FA from the given right linear grammar Closure Properties of CFL's (Union, concatenation and Kleen closure) Method and examples	8	-	-
4	**Unit 4: Push Down Automaton** Definition of PDA and examples Construction of PDA using empty stack and final State method : Examples using stack method Definition DPDA & NPDA Examples of DPDA & NPDA CFG (in GNF) to PDA : Method and examples	6	-	-
5	**Unit 5: Turing Machine** Model and Definition of TM Design of Turing Machines Problems on language recognizers. Language accepted by TM Types of Turing Machines Introduction to LBA (Basic Model) & CSG(Without Problems) Recursive Languages and Recursively enumerable Languages. Turing Machine Limitations	6	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS3202**			
Course Category	**Core Computer Science**			
Course Title	**Programming in Java – II**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of C or C++ Programming Language
2. Knowledge of classes, objects, streams, Exception handling and file handling in Java.

Course Objectives:

Students will learn

1. Collection, different types of inheritance, interface
2. Graphics programming, Event Handling in Java
3. Multithreading Concept
4. To design User Interface using Swing and AWT
5. Introduction to MVC architecture

Course Outcomes:

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

1. Students will learn Collection, different types of inheritance, interface, and multithreading concept.
2. Learn the Internet Programming, using Java Applets
3. Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings
4. Apply event handling on AWT and Swing components.
5. Students will get knowledge of MVC architecture.

Course Contents:

Collection : Introduction of different classes and interfaces in Java

Inheritance and Interface : Different types of inheritance and interface

Multithreading: Creation and implementation of multithreading

Applet and AWT : Introduction and creation of applet, AWT components

SWING : Introduction to MVC Architecture, Layout Manager, SWING components

Learning Resources:

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Reference Books:

1. Complete reference Java by Herbert Schildt(5th edition)
2. Java 2 programming black books, Steven Horlzner
3. Programming with Java , A primer , Fourth edition , By E. Balagurusamy
4. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

Pedagogy: Participative learning, discussions, algorithm, flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Collection :** Introduction to the Collection framework, List – ArrayList, LinkedList and Vector,Stack,Queue, Set - HashSet, TreeSet, and LinkedHashSet, Map – HashMap, LinkedHashMap, Hashtable and TreeMap, Interfaces such as Comparator, Iterator, ListIterator, Enumeration	5	-	-
2	**Inheritance and Interface :** Inheritance, Inheritance Hierarchy, Super class, Overriding, Polymorphism, Access modifier, Wrapper classes, Reflection - 'Class' class, Interfaces, Inner classes, Abstract Classes.	5	-	-
3	**Multithreading:** What are threads? Life cycle of thread, Running and starting thread using Thread class, Thread priorities, Running multiple threads, The Runnable interface, Synchronization and interthread communication	5	-	-

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4	**Applet and AWT** **Applet :** Introduction, Types applet, Applet Life cycle, Creating applet, Applet tag, Applet Classes, Color, Graphics, Font **AWT:** What is AWT ? Components and container used in AWT Layout managers, Event Handling: Event sources, Listeners, Mouse and Keyboard Event Handling, Adapters, Anonymous inner class	8	-	-
5	**SWING :** The MVC Architecture and Swing, Introduction to layout management, Text Fields, Labels, Check boxes, Radio buttons, List, Combo boxes, Border, Scrollbars, Scrolling window, Menus, Reacting to menu events, Icons in item menus, checkbox and radio button, menu items, Popup menu, Dialog boxes.	7		

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3203**			
Course Category	**Core Computer Science**			
Course Title	**Internet Programming using PHP-II**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of HTML, Basic PHP

Course Objectives:

1. PHP framework for effective design of web application.
2. Design web pages dynamically and more innovatively.
3. Learn AJAX to make our application more dynamic.
4. Learn different technologies used at client Side Scripting Language.
5. Learn XML, CSS and XML parsers.

Course Outcomes:

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

1. Use XML to save and format data
2. Demonstrate the advance concepts of PHP programming
3. Experiment with database design
4. Define and discuss content management systems
5. Create basic Action Script coding

Course Contents:

1. State Management – Strings, cookies and sessions

2. Database Connectivity – Database connection, DML

3. Handling email with PHP – Email protocol, Structure and Error handling

4. XML -Structure, document object and value.

5. AJAX – Introduction and connecting database

6. Exception handling – Try catch blocks

Learning Resources:

Reference Books:

1. Programming PHP by RasmusLerdorf and Kevin Tatroe O'Reilly publication
2. Beginning PHP 5, Wrox publication
3. PHP XML and Web Services by Rob Richards
4. AJAX Black Book Kogent solution

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Web Resources:

1. www.php.net.in
2. www.w3schools.com
3. www.wrox.com

Pedagogy: Participative learning, discussions, Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	10	10	-	-	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**State Management** Using query string (URL rewriting), Using Hidden field, Using cookies &sessions	4	-	-
2	**Database Connectivity** Connection with Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter, Executing query, Join (Cross joins, Inner joins, Outer Joins, Self joins.).	5	-	-
3	**Handling email with PHP** Email background, Internet mail protocol, Structure of an email message, Sending email with PHP Email attachments using PHPMailer, Email id validation and verification, PHP error handling.	5	-	-
4	**XML & JSON** What is XML?, XML document Structure, PHP and XML, The	6	-	-

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	document object model, The simple XML extension, Changing a value with simple XML, JSON Functions, Encoding JSON in PHP (json_encode), Decoding JSON in PHP (json_decode),			
5	**AJAX** Introduction of AJAX, AJAX web application model, AJAX – PHP framework, Handling XML data using PHP and AJAX, Connecting database using PHP and AJAX.	6	-	-
6	**Exception handling** Handling PHP Exceptions, Using Try & Catch blocks, The Exception Object, Generating Custom Exceptions, Multiple Catch Blocks, and Default Exception Processing.	4	-	-
		30	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3206B**			
Course Category	**Core Computer Science**			
Course Title	**Cyber Law & Security**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: Knowledge of Computer Science.

Course Objectives:

1. To learn different cyber laws
2. To know what is cyber stalking
3. To understand security concepts

Course Outcomes:

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

1. Get the knowledge of cyber security – threats, detection and prevention and cyber laws and provisions. Students will understand the complexities involved in cases pertaining to technology. Students will get the information to reconcile the incompatibility between the ever changing technology and the stable law.

Course Contents:

Cyberspace and the Law: Concept and Legal Determination

Evolution of law in Cyberspace, Insurance and the Internet, Intellectual Property in Cyberspace, At least two case studies on each, Article –At least one topic.

Information Technology Act 2000

Electronic Governance, Attribution, Acknowledgement and Dispatch of Electronic Records, Secure electronic Records and Secure Digital Signatures, Regulation of certifying Authorities, Duties of Subscribers, Case studies.

Information Security Concepts

Information Security Overview: Background and Current Scenario, Types of Attacks, Goals for Security, E-commerce Security, Computer Forensics, Steganography

Security Threats and Vulnerabilities

Overview of Security threats,Weak / Strong Passwords and Password Cracking,Insecure Network connections, Malicious Code, Programming Bugs, Cyber crime and Cyber terrorism, Information Warfare and Surveillance

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Learning Resources:

1. Cyber Law in India — Dr. Farooq Ahmad (Published By- Pioneer Books)
2. Guide to Cyberlaws — Rodney D.Ryder(Published By - Wadhwa Nagpur)
3. Cyber Laws — Justice Yatindra Singh
4. Cybersecurity and Cyberwar: What Everyone Needs to Know

Pedagogy:

Participative learning, discussions, algorithm, Flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA) :50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	10	10	-	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Cyberspace and the Law: Concept and Legal Determination** Evolution of law in Cyberspace, Insurance and the Internet, Intellectual Property in Cyberspace, At least two case studies on each, Article –At least one topic.	5	-	-
2	**Information Technology Act 2000 [12]** Electronic Governance, Attribution, Acknowledgement and Dispatch of Electronic Records, Secure electronic Records and Secure Digital Signatures, Regulation of certifying Authorities, Duties of Subscribers, Case studies.	12	-	-
3	**Information Security Concepts [6]** Information Security Overview: Background and Current Scenario, Types of Attacks, Goals for Security, E-commerce Security, Computer Forensics, Steganography	7	-	-
4	**Security Threats and Vulnerabilities [7]** Overview of Security threats,Weak / Strong Passwords and Password Cracking,Insecure Network connections, Malicious Code, Programming Bugs, Cyber crime and Cyber terrorism, Information Warfare and Surveillance	6	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3206C**			
Course Category	**Core Computer Science**			
Course Title	**PHP Frameworks**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: Knowledge of HTML, CSS, PHP, XML and AJAX etc.

Course Objectives:

1. Developers should utilize PHP frameworks for speeding up the development process.
2. Reusing code across similar projects will save the developer a substantial amount of time and effort.
3. A framework offers pre-built modules for performing tedious coding tasks, so the developer can spend their time on developing the actual application rather than re-building the foundation with each and every project.

Course Outcomes:

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

1. Become familiar with some basic WordPress terminology
2. Get logged into the framework and become familiar with the parts of the framework Admin Panel
3. Be able to create a new page with some basic formatting and information: Creating a New Page
4. Be able to edit an existing page: Edit an Existing Page

Course Contents:

1. WordPress Framework – Basics of user interface, plug-ins, themes, content management

2. Drupal Framework – Introduction, administering, working with Drupal

Learning Resources:

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Reference Books:

1. Professional Word Press: Design and Development Brad Williams, David Damstra, Hal Stern
2. Web Designer's Guide to Word Press Jesse Friedman

Web Resources:

1. www.tutorialspoint.com/wordpress/
2. www.wpbeginner.com/category/wp-tutorials/
3. https://groups.drupal.org/node/509541

Pedagogy: Participative learning, discussions, Team work, coding, experiential learning through practical problem solving, presentation and implementation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	-	10	20	-	-	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**WordPress Framework** **Introduction to Word Press** Understanding and Using domain names, WordPress Hosting Options, Installing WordPress on a Dedicated Server. **Basics of the Word Press User Interface** Understanding the Word Press Dashboard, Pages, Tags, Media and Content Administration, Core Word Press Settings **Finding and Using Word Press Plugins** Finding and Installing Plugins Quickly and Easily, Upgrading Word Press Plugins **Working with Word Press Themes** Understanding the Structure of WordPress Themes, Finding Themes and Choosing the Right One Installing and Configuring Themes, Editing and Customizing Themes, Using Theme Frameworks and Parent-Child Themes	15	-	-

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	Word Press Content Management Understanding Posts versus Pages, Organizing Posts with Categories, Connecting Posts Together with Tags, Custom Post Types and Custom Taxonomies, Managing Lists of Links			
2	**Drupal Framework** Introduction to GNU/Linux Command Line Git Basics Programming - Best Practices Drupal Overview Drupal Site Building Introduction to Drush Drupal Module Development Drupal Database API Basics Drupal Security Guidelines Drupal Performance Drupal Theming Drupal Debugging Security Updates and Applying Patches Content Architecture Advanced Theming Drupal SEO	15	-	-
		30	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3301**			
Course Category	**Core Computer Science**			
Course Title	**Data Communication and Networking**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites: Basics of computer, Knowledge of 'C' for assignment.

Course Objectives:

1. To understand the concept of networking models, protocols and functionality of each layer.
2. To be familiar with components required to build different types of networks.
3. To learn types of addresses required in data communication.

Course Outcomes:

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

1. Student will able differentiate between networking models, protocols and functionality of each layer.
2. Students will able to explain components required to build different types of networks.
3. Students should know different types of addresses required in data communication.

Course Contents:

Introduction to Computer Networks

It will cover Computer Networks applications, Protocols

Network Models

What is OSI and TCP/IP Reference Model

The Physical Layer

Overview of Basic Concepts Signals, Types – Analog and Digital, Performance of the Network, Different Transmission Modes-Parallel Transmission, Serial Transmission Switching Circuit Switching, Message Switching and Packet Switching Physical Layer Devices Repeaters, Hubs-active hub Passive hub.

The Data Link Layer

Various Design Issues Services to Network Layer, what is Sliding Window Protocols-

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Piggybacking ,Data Link Layer Protocols :HDLC ,PPP, different Data Link Layer Devices
Use of Remote bridges

The Medium Access Sublayer

What is Random Access Protocols, what is ALOHA ,CSMA,CSMA/CD,CSMA/CA
What is FDMA,TDMA , CDMA

The Transport Layer

How Process-to-Process Delivery done by transport layer, what is User Datagram Protocol and Transmission Control Protocol (TCP)

The Application Layer

What is Domain Name System (DNS),what is File Transfer Protocol (FTP), what is WWW and HTTP

Learning Resources:

Reference Books:

1.Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]

2.Data Communication and Networking by Behrouz Forouzan, TATA McGraw Hill. [4th Edition]

3.Networking All In One Dummies Wiley Publication.[5th Edition]

4.Cryptography and network security by atul kahate , Tata McGraw-Hill Education.[3rd Edition]

Data Communications and Networks: An Engineering Approach, Irvine, Wiley Publication

Web Resources:

1. http://www.computernetworkingnotes.com
2. http://www.cs.utsa.edu
3. http://fmfi-uk.hq.sk

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Pedagogy:
Participative learning, discussions, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Attendance	Internal Examination	Any other
10	10	10	10	10	-

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1.	**Introduction to Computer Networks** Computer Networks -goals and applications Protocols and Standards Network Software Protocol Hierarchies Connection-oriented and connectionless service	2	-	-
2.	**Network Models** OSI Reference Model TCP/IP Reference Model Comparison of OSI and TCP/IP model Addressing Physical, Logical and Port addresses	3	-	-
3.	**The Physical Layer** Basic Concepts Signals, Types – Analog and Digital Transmission Impairments Performance of the Network Line Coding Characteristics, Line Coding Schemes Transmission Modes-Parallel Transmission, Serial Transmission Switching Circuit Switching, Message Switching and Packet Switching Physical Layer Devices Repeaters, Hubs- active hub Passive hub	7	-	-

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4.	**The Data Link Layer** Design Issues Services to Network Layer, Flow Control, Error Control Elementary Data Link Layer Protocols A Simplex protocol for noisy channel Sliding Window Protocols- Piggybacking Data Link Layer Protocols :HDLC ,PPP Data Link Layer Devices Remote bridges	5	-	-
5.	**The Medium Access Sub layer** Random Access Protocols ALOHA ,CSMA CSMA/CD,CSMA/CA Controlled Access Reservation, Polling and Token Passing Channelization FDMA TDMA , CDMA	4	-	-
6.	**The Transport Layer** Process-to-Process Delivery User Datagram Protocol Transmission Control Protocol (TCP)	5	-	-
7.	**The Application Layer** Domain Name System (DNS) File Transfer Protocol (FTP) WWW HTTP	4	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS-3302**			
Course Category	**Core Computer Science**			
Course Title	**Introduction to UNIX & Shell Scripting**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. A basic knowledge of c programming and operating system.
2. Basic understanding of Unix

Course Objectives:

1. To Write simple scripts to enhance basic command output
2. To understand use of various shell quoting mechanisms appropriately
3. To Manipulating shell variables and user-defined variables in scripts
4. To Implementing conditional execution facilities
5. To write User defined Functions

Course Outcomes:

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

1. Identify and use UNIX utilities to create and manage simple file processing operations, organize directory structures
2. Develop shell scripts to perform more complex tasks.
3. Use command substitution to capture program output.
4. Use conditional statements to control the execution of shell scripts.
5. Write shell scripts to perform repetitive tasks using while and for loops.
6. Design and implement shell functions.
7. Identify and process command-line arguments.

Course Contents:

Introduction to Unix
Introduction to Unix.
File Management
Directory Management
Creating Directories
Creating Parent Directories
Removing Directories
File Permission / Access Modes
File Access Modes
Directory Access Modes
What is Shell?
What is Shell Prompt
Extended Shell Scripts
Shell Variables ,operators and loop control

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Variable ,Basic Operators, Loop Control
Shell Input/output Redirections
input/ Output Redirection ,redirect commands
Shell Functions
Creating Functions, Nested Functions

Learning Resources:

Reference Books:

1. Classic Shell Scripting: Hidden Commands that Unlock the Power of Unix Book by Stephen P. Robbins
2. Shell Scripting Tutorial Book by Steve Parker
3. Linux Command Line and Shell Scripting Bible Book by Richard Blum

Pedagogy: Participative learning, discussions, algorithm, Flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation

Assessment Scheme:
Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to Unix** What is Unix? Unix Architecture File Management:Listing Files Metacharacters ,Hidden Files ,Creating Files,Editing Files Display Content of a File Counting Words in a File Copying Files ,Renaming Files,Deleting Files Standard Unix Streams	3	-	-

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2	**Directory Management** Home Directory Absolute/Relative Pathnames Listing Directories Creating Directories Creating Parent Directories Removing Directories Changing Directories Renaming Directories	6	-	-
3	**File Permission / Access Modes** The Permission Indicators File Access Modes Directory Access Modes Changing Permissions Using chmod with Absolute Permissions Changing Owners and Groups Changing Group Ownership SUID and SGID File Permission	5	-	-
4	**What is Shell?** Shell Prompt Shell Types Shell Scripts Comments Extended Shell Scripts	3	-	-
5	**Shell Variables ,operators and loop control** Variable Special Variables Command-Line Arguments Special Parameters $* and $@ Exit Status ,Using Shell Arrays Basic Operators Loop Control	5	-	-
6	**Shell Input/output Redirections** Output Redirection Input Redirection Here Document Discard the output Redirection Commands	3	-	-
7	**Shell Functions** Creating Functions Pass Parameters to a Function Returning Values from Functions Nested Functions Function Call from Prompt	5	-	-

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

COURSE STRUCTURE

Course Code	**MIT-WPU- BCS3303**			
Course Category	**Core Computer Science**			
Course Title	**Advance Java**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge of classes, objects, streams, Exception handling and file handling in Java.
2. Knowledge of Collection, inheritance, interface, applet, AWT and Swing

Course Objectives:

Students will learn

1. Java Database connectivity (JDBC)
2. Network programming
3. Java Beans Concept
4. To study web development concept using Servlet and JSP

Course Outcomes:

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

1. Students will learn database connectivity
2. Students will learn network programming
3. Students will learn Java Beans Concept
4. Students will able to create webpages using Servlet and JSP

Course Contents:

JDBC : Database connectivity with Java

Networking : Introduction of network programming

Servlet : Web development concept using Servlet

JSP: Web development concept using JSP

Java Beans : Introduction to Java Beans

Learning Resources:

Reference Books:

1. Complete reference Java by Herbert Schildt(5th edition)
2. Java 2 programming black books, Steven Horlzner
3. Programming with Java , A primer , Fourth edition , By E. Balagurusamy
4. Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

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Pedagogy: Participative learning, discussions, algorithm, flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA) 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**JDBC:** The design of JDBC, Basic JDBC program Concept, Drivers Architecture of JDBC, Making the Connection, Statement, ResultSet , PreparedStatement, CollableStatement, Executing SQL commands, Executing queries	5	-	-
2	**Networking:** The java.net package, Connection oriented transmission – Stream, Socket Class, Creating a Socket to a remote host on a port (creating TCP client and server), Simple Socket Program Example.	5	-	-
3	**Servlet:** Introduction to Servlet and Hierarchy of Servlet, Life cycle of servlet, Tomcat configuration (Note: Only for Lab Demonstration), Handing get and post request (HTTP), Handling a data from HTML to servlet, Retriving a data from database to servlet, Session tracking – User Authorization, URL rewriting, Hidden form fields, Cookies and HttpSession	8	-	-
4	**JSP:** Simple first JSP program, Life cycle of JSP, Implicit Objects, Scripting elements – Declarations, Expressions, Scriplets, Comments, JSP Directives – Page Directive, include directive, Mixing Scriplets and HTML, Example of forwarding contents from database to servlet, servlet to JSP and displaying it using JSP scriplet tag	7	-	-
5	**Java Beans:** What is bean? Advantages, Using Bean Development kit(BDK), Introduction to jar and manifest files, The java beans API	5		

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COURSE STRUCTURE

Course Code	**MIT-WPU- BCS3306B**			
Course Category	**Elective**			
Course Title	**Introduction to Data Science**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Basic understanding of programming language, statistics

Course Objectives:

1. To understand basic concepts of data analytics, business intelligence, data science, big data.

Course Outcomes:

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

1. Basic concepts of Data Science and Big data.

Course Contents:

Introduction to Data Analytics and Business Intelligence:
What is Data analytics? Need of Data analytic lifecycle
Basic statistics :
Introduction to Probability, Probability Distributions, Connection with Statistical Distributions
Introduction to Data Science:
What is data science? ,Introduction to data storytelling, Understanding your rights to use data
Introduction to Big Data: Definition:
Big Data, Big Data examples, Data explosion, Data volume, Data Velocity
Big Data Processing:
Big Data technologies, Introduction to Google file system, Hadoop Architecture

Learning Resources:

Reference Books:

1. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business by AmbigaDhiraj, Wiely CIO Series.
2. "Data Science & Big Data Analytics" by David Dietrich, Barry Hiller, , EMC education services, Wiley publications, 2012
3. "Business analytics: the next frontier for decision sciences." By Evans , James R., and Carl H. Lindner, Decision Line
4. Big Data, Black Book, DT Editorial Services, ISBN : 9789351197577, 2016 Edition
5. A.Ohri, R for Business Analytics, Springer, ISBN:978-1-4614-4343-8

Pedagogy: Participative learning, discussions, algorithm, Flowchart & Program writing, experiential learning through practical problem solving, assignment, PowerPoint presentation.

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

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Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
10	10	-	-	10	10	10

Term End Examination : 50 Marks

Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to Data Analytics and Business Intelligence :** What is Data analytics? Need of Data analytic lifecycle, various phases of Data analytic lifecycle, what is business analytics? Business decision? Features of Business analytics, Types of business analytics, Definition of Business Intelligence	5	-	-
	Basic statistics : Introduction to Probability, Probability Distributions, Connection with Statistical Distributions, Statistical Properties (Mean, Mode, Median, Moments, Standard Deviation, etc.), Common Probability Distributions (Discrete, Binomial, Normal), Other Probability Distributions (Chi-Square, Poisson), Joint and Conditional Probabilities	5	-	-
3	**Introduction to Data Science:** What is data science? ,Introduction to data storytelling, Understanding your rights to use data, What is open data?, The data spectrum, Gathering data, Business Intelligence Vs Data science, Data Scientist roles and responsibility, Data science tools and technology	7	-	-
4	**Introduction to Big Data: Definition:** Big Data, Big Data examples, Data explosion, Data volume, Data Velocity, Big data infrastructure and challenges, Big Data Processing, Architectures, Big data learning approaches	5	-	-
5	**Big Data Processing:** Big Data technologies, Introduction to Google file system, Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read , Name Node, Secondary Name Node, and Data Node, Hadoop MapReduce paradigm, Map Reduce tasks, Job, Task trackers	8	-	-

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COURSE STRUCTURE

Course Code	**MIT-WPU-BCS3306C**			
Course Category	**Core Computer Science**			
Course Title	**Software Testing & Quality Assurance**			
Teaching Scheme and Credits	**L**	**T**	**Laboratory**	**Credits**
Weekly load hrs	**3**	**-**	**-**	**2**

Pre-requisites:

1. Knowledge about software and software engineering

Course Objectives:

1. To understand effectively strategies, methods and technologies of software testing, design test plan and test cases
2. To establish a testing group and manage the whole testing project
3. To clearly and correctly report the software defectives
4. To assess the software product correctly and distinguish between the software testing and the quality assurance

Course Outcomes:

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

1. Analyze different approaches to software testing and quality assurance, and select optimal solutions for different situations and projects.
2. Conduct independent research in software testing and quality assurance and apply that knowledge in their future research and practice.

Course Contents:

Introduction to Software Quality Assurance
Introduce concepts of quality assurance and quality control.

Introduction to Software testing
Introduce components of software testing. Discuss difference between QA and Testing.

Verification and Validation
Introduce to terms verification and Validation.

Software Testing Methods
Introduce various methods of testing.

Software Testing Strategies
Introduce various types of testing during software development.

Software Metrics
Introduce software quality measures

Defect Management
Introduce defects and describes defect management.

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Quality Improvement

Describes various strategies for overall quality improvement

Software Quality Assurance

Describes activates in software quality assurance in brief. Introduce ISO 9001 Quality Standard.

Quality Costs

Introduce concept of quality cost.

Learning Resources:

Reference Books:

1. Testing Computer Software, Cem Kaner, Jack Falk, and Hung Quoc Nguyen2.
2. Practical Software Testing: A Process-Oriented Approach, Burnstein, Springer, ISBN 978-81-8128-089-3
3. Software Testing in the Real World: Improving the Process, Edward Kit
4. The Art of Software Testing, Glenford J. Myers, Wiley.
5. Customer Oriented Software Quality Assurance, Frank P. Ginac
6. Metrics and Models in Software Quality Engineering, Stephen H. Kan,
7. Software testing by yogesh singh Cambridge publication
8. Quality Management, 5th ed., Prentice-Hall, 2010. Donna C. S. Summers

Supplementary Reading:

1. Automated Software Testing: Introduction, Management, and Performance, Elfriede Dustin, Jeff Rashka, and John Paul,
2. Inroads to Software Quality: "How To" Guide and Toolkit, Alka Jarvis and Vern Crandall

Weblinks:

www.w3schools.com

www.tutorialspoint.com

Pedagogy:

Participative learning, discussions, Problem Solving, experiential learning through practical problem solving, assignment, PowerPoint presentation

Assessment Scheme:

Class Continuous Assessment (CCA): 50 Marks

Assignments	Test	Presentations	Case study	MCQ	Oral	Attendance
20	-	10	10	-	-	10

Term End Examination : 50 Marks

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Syllabus:

Module No.	Contents	Workload in Hrs		
		Theory	Lab	Assess
1	**Introduction to Software Quality Assurance** Software Quality Assurance, Software Quality, Quality Control, Quality Assurance, Quality Factors, Difference between quality control and quality assurance	2	-	-
2	**Introduction to Software testing** Software Testing, Terms: fault, failure, error, fault masking, test, test case, Fundamental Test process: test planning, test specification, test execution, test records, test completion, Difference between QA and Testing	2	-	-
3	**Verification and Validation** Definition of Verification & Validation, Different types of Verification & Validation Mechanisms, Concepts of Software Reviews, Inspection and Walkthrough	2	-	-
4	**Software Testing Methods** Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, System Testing	2	-	-
5	**Software Testing Strategies** Strategic Approach to Software Testing, Unit Testing, Integration Testing, Validation Testing, System Testing	3	-	-
6	**Software Metrics** Concept and Developing Metrics, Different types of Metrics, Complexity metrics	2	-	-
7	**Defect Management** Definition of Defects, Defect Management Process, Defect Reporting, Metrics Related to Defects, Using Defects for Process Improvement	4	-	1
8	**Quality Improvement** Introduction, Pareto Diagrams, Cause-effect Diagrams, Scatter Diagrams, Run charts	4	-	-
9	**Software Quality Assurance** Concepts, Quality Movement, Background issues and SQA activities Software Reviews Formal Technical Reviews, Software Reliability, SQA Plan, The ISO 9001 Quality Standard	5	-	1
10	**Quality Costs** Quality Cost Measurement, Utilizing Quality Costs for Decision-Making	2	-	-

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