



University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
Institute of Engineering & Management, New Town Campus
University of Engineering & Management, Jaipur



5th Semester Syllabus for BCA Admission Batch 2025
(Tentative)

Course structure									
SEMESTER 5									
SL NO	TYPES OF COURSE	SUB CODE	SUB NAME	L	T	P	S	TOTAL CONTACT HRS	CREDIT POINTS
THEORY									
1	Computer Science & Application	BCACC501	Introduction to Machine learning	3	1	0	0	4	4
2	Multidisciplinary	BCAMD501	Software Engineering	3	1	0	0	4	4
3	Computer Science & Application	BCACL502	Introduction to Cloud Computing and visualization	3	1	0	0	4	4
4	Computer Science & Application	BCACS502	Introduction to Cyber Security	3	1	0	0	4	4
5	Computer Science & Application	BCAIR502	Introduction to IoT Architecture and Robotics	3	1	0	0	4	4
6	Computer Science & Application	BCAMM502	Introduction to Computer Graphics	3	1	0	0	4	4
7	Computer Science & Application	BCAQC502	Introduction to Quantum Computing	3	1	0	0	4	4
8	Computer Science & Application	BCAWP502	Introduction to web development using PHP and MySQL	3	1	0	0	4	4
9	Value Added Course	BCAGS501	General Studies & Current Affairs-V	2	1	0	0	2	2
PRACTICAL									
10	Computer Science & Application	BCACC591	Machine learning with Python lab	0	0	4	0	4	2
11	Computer Science & Application	BCACL592	Cloud Deployment Lab	0	0	4	0	4	2
12	Computer Science & Application	BCACS592	Cyber Security Lab	0	0	4	0	4	2
13	Computer Science & Application	BCAIR592	IOT Application Development Lab	0	0	4	0	4	2

[illegible]



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Syllabus and Lesson Plan

Subject Name: **Introduction to Machine Learning**

Credit: 4

Lecture Hours: 40

Subject Code: **BCACC501**

Pre-requisite: Basics knowledge of python programming

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Dr. Rajendrani Mukherjee
2. Prof. Raimoni Hansda

Relevant Links:

[Study Material](#)

[Coursera](#)

[LinkedIn Learning](#)

[NPTEL](#)

COURSE OBJECTIVES:

Throughout the course, students will be expected to demonstrate their understanding of Machine Learning concepts and algorithms by being able to do each of the following:

1. To apply fundamental concepts of Python Programming & sklearn library for problem solving
2. To understand the fundamentals of different ML algorithms along with their parameters.
3. To understand and apply and work with pandas dataframe ,numpy sklearn
4. To apply logical reasoning to design programs using ML models using python modules and packages.

COURSE OUTCOMES:

CO1: Understand the importance and basic concepts of Python Programming & sklearn library for problem solving.

CO2: To understand basic concepts of different supervised learning algorithms.

CO3: To get familiarize and understand basic concepts of different unsupervised learning algorithms.

CO4: Understand some basic properties of Preprocessing of Data.

Module No	Topic	Sub Topic	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
Module 1	Introduction to Machine Learning	Introduction to human and machine learning, application of ML, Tools of ML, Types of ML	Machine Learning, Chapter 1, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das	International Academia: https://openlearninglibrary.mit.edu/courses/course-v1:MITx+6.036+1T2019/courseware/Week1/intro_ml/?activate_block_id=block-v1%3AMITx%2B6.0	10	Basic python programs using Numpy package and implementation of SciPy ,matplotlib ,pandas packages for data preprocessing as well as data visualization
	Preparing Model	ML activities, Data types, data preprocessing	Machine Learning, Chapter 2, Saikat Dutta, Subramanian			

			Chandramouli, Amit Kr. Das	36%2B1T2019%2Btype%40sequential%2Bblock%40intro_ml/		
	Model Evolution	Model selection, Model Training, Model Representation, Performance Evolution	Machine Learning, Chapter 3, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das	Industry Mapping: TensorFlow PyTorch: scikit-learn: NumPy and) ,Pandas		
	Jupyter Notebook and packages installation process to run ML programs	Why Python? scikit-learn, Installing scikit-learn ,Essential Libraries and Tools , Jupyter Notebook NumPy ,SciPy , matplotlib ,pandas,mglearn,	Study Materials			
Module 2	Supervised Learning-1: Classification	Introduction to Supervised Learning and Its application, Introduction to classification, Classification model evolution.	Machine Learning, Chapter 7, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das	International Academia: https://openlearninglibrary.mit.edu/courses/course-v1:MITx+6.036+1T2019/courseware/Week1/intro_ml/?activate_block_id=block-v1%3AMITx%2B6.036%2B1T2019%2Btype%40sequential%2Bblock%40intro_ml/	10	1. Programming for problem solving using k-NN 2. Programming for problem solving using Decision tree 3. Programming for problem solving using k-NN 4. Programming for problem solving using Support vector machine
	Types of Classification	Various Model: k-NN, Decision tree, Random forest, Support vector machine	Machine Learning, Chapter 7, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das			

				scikit-learn: NumPy and) ,Pandas		
Module 3	Supervised Learning-2: Regression	Introduction to Regression, Difference between classification and regression, Application of regression, model evolution.	Machine Learning, Chapter 8, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das	International Academia: https://openlearninglibrary.mit.edu/courses/course-v1:MITx+6.036+1T2019/courseware/Week1/intro_ml/?activate_block_id=block-v1%3AMITx%2B6.036%2B1T2019%2Btype%40sequential%2Bblock%40intro_ml/ Industry Mapping: TensorFlow PyTorch: scikit-learn: NumPy and) ,Pandas	10	1. Programming for problem solving using linear regression 2. Programming for problem solving using multiple regression 3. Programming for problem solving using polynomial regression 4. Programming for problem solving using logistic regression
	Types of Regression	Simple and multiple linear regression, Polynomial regression, Logistic regression, Maximum Likelihood Estimation	Machine Learning, Chapter 8, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das			
Module 4	Unsupervised Learning-1: Introduction	Introduction to unsupervised learning, Supervised Vs. Unsupervised Learning, Application of Unsupervised learning,	Machine Learning, Chapter 9, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das	International Academia: https://openlearninglibrary.mit.edu/courses/course-v1:MITx+6.036+1T2019/courseware/Week1/intro_ml/?activate_block_id=block-v1%3AMITx%2B6.036%2B1T2019%2Btype%40sequential%2Bblock%40intro_ml/	10	1. Programming for problem solving using k-Means Clustering 2. Program based on association rule
	Unsupervised Learning-2: Types of unsupervised learning	Clustering, Different types of clustering, k-Means Clustering, Association rule, apriori algorithm	Machine Learning, Chapter 9, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das			

	Basic concept of Neural Network	Introduction to ANN, Implementation of ANN, ReLU function	Machine Learning, Chapter 10, Saikat Dutta, Subramanian Chandramouli, Amit Kr. Das	pe%40sequential%2Bblock%40intro_ml/ Industry Mapping: TensorFlow PyTorch: scikit-learn: NumPy and) ,Pandas		
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Detailed Lesson Plan:

Module 1: Introduction to Machine Learning

Working Day	Lesson Plan Description
Day 1	Introduction to Machine learning, Human learning vs. Machine learning
Day 2	Application, advantages of Machine Learning
Day 3	Tools Used for Machine Learning
Day 4	Types of Machine Learning
Day 5	Data preprocessing concept
Day 6	Model selection, Model Training
Day 7	Model Representation, Performance Evolution
Day 8	Jupyter note book installation process
Day 9	Basic package installation to run ML program
Day 10	Implementation of NumPy ,SciPy ,and matplotlib packages

Module 2: Supervised Learning-1: Classification

Working Day	Lesson Plan Description
Day 11	Introduction to Supervised Learning
Day 12	Real life application of supervised learning
Day 13	Advantages of supervised learning
Day 14	Introduction to classification
Day 15	Classification model evolution
Day 16	k-NN
Day 17	Decision tree
Day 18	Random forest
Day 19	Support vector machine
Day 20	Various model comparison

Module 3: Supervised Learning-2: Regression

Working Day	Lesson Plan Description
Day 21	Introduction to regression
Day 22	Classification vs. Regression
Day 23	Real life application of regression
Day 24	Simple linear regression
Day 25	Multiple linear regression
Day 26	Regression analysis
Day 27	Polynomial regression
Day 28	Logistic regression
Day 29	Maximum Likelihood Estimation
Day 30	Problem solving based on regression

Module 4: Unsupervised Learning

Working Day	Lesson Plan Description
Day 31	Introduction to unsupervised learning
Day 32	Supervised Vs. Unsupervised Learning
Day 33	Real life application of unsupervised learning to solve problem
Day 34	Introduction to clustering
Day 35	Types of clustering
Day 36	K-means clustering
Day 37	Hierarchical clustering
Day 38	Association rule
Day 39	Apriori algorithm
Day 40	Introduction and application of ANN, ReLU function

Learning Resources:

Text Books:				
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher	
AMIT KUMAR DAS, SAIKAT DUTT, SUBRAMANUIM CHANDRAMOULI	MACHINE LEARNING	ISBN 978-93-530-6669-7	PEARSON	
Reference Books:				
Andreas C. Müller and Sarah Guido	Introduction to Machine Learning with Python A Guide for Data Scientists	FIFTH Edition	SPD Books	Download eBook

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3			3	2		1	2
CO2	2	3	3	3	2	3	3	1		1	2	3
CO3	2	3	3	3	2	3	3	1		1	2	3
CO4	1	2	1	1	2			2	1			2

3: Strong correlation 2: Medium correlation 1: Weak correlation

PSO	PSO Description
PSO1	Technical Knowledge and Problem-Solving: Apply fundamental concepts of computer applications, programming languages, data structures, algorithms, and database management to analyse and solve computational problems effectively.
PSO2	Software Design and Development: Demonstrate the ability to design, develop, test, and deploy software solutions by utilizing modern tools, technologies, and logical programming skills for real-world applications across domains such as web, mobile, and enterprise systems.
PSO3	Professional Skills and Ethics: Exhibit effective communication, teamwork, leadership, and ethical practices while adapting to emerging IT trends, thereby contributing responsibly to societal and organizational development.

QUESTION PAPER PATTERN AND DATES:

EXAMINATION	Dates	PART – A	PART – B	PART – C	TOTAL MARKS
Mid Term 1	August 10, 2026- August 18,2026	Attempt 5 out of 10 questions; Each question carries 2 marks (2×5)	Attempt 2 out of 4 questions; Each question carries 5 marks (5×2)	Attempt 1 out of 2 questions; Each question carries 10 marks (10×1)	30
Mid Term 2	October 6,2026- October 13,2026	Attempt 5 out of 10 questions; Each question carries 2 marks (2×5)	Attempt 2 out of 4 questions; Each question carries 5 marks (5×2)	Attempt 1 out of 2 questions; Each question carries 10 marks (10×1)	30
End Semester Examination	November 17,2026- December 4,2026	Attempt 10 out of 15 questions; Each question carries 2 marks (2×10)	Attempt 6 out of 9 questions; Each question carries 5 marks (5×6)	Attempt 5 out of 8 questions; Each question carries 10 marks (10×5)	100

Examination Rules & Regulations:

[IEM-UEM Examination Rules and Regulations](#)



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Syllabus and Lesson Plan

Subject Name: **Software Engineering**

Credit: 4

Lecture Hours: **40**

Subject Code: BCAMD501

Pre-requisite:

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Prof. Pradipta Roy
2. Prof. Mohit Das

Relevant Links:

[Study Material](#)

[Coursera](#)

[LinkedIn Learning](#)

[NPTEL](#)

COURSE OBJECTIVES:

Throughout the course, students will be expected to demonstrate their understanding of Software Engineering by being able to do each of the following:

1. To introduce the students to a branch of study associated with the development of a software product.
2. To gain basic knowledge about the pre-requisites for planning a software project.
3. To learn how to design of software.
4. To enable the students to perform testing of a software.

COURSE OUTCOMES:

CO1: Identify software requirements for manual or automated real-world systems

CO2: Compare and contrast software process models and software development methodologies.

CO3: Illustrate the software requirement specification, and system design.

CO4: Develop ability to critically analyze and evaluate a variety of management practices in the contemporary context.

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Module No	Topic	Sub Topic	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours
Module 1	Fundamentals of Software Engineering	Evolution—From an Art Form to an Engineering Discipline, Software Development Projects, Exploratory Style of Software Development, Emergence of Software Engineering, Notable Changes in Software Development Practices, Computer Systems Engineering, A Few Basic Concepts, Waterfall Model and its Extensions, Rapid Application Development (RAD), Agile Development Models, Spiral Model, A Comparison of Different Life Cycle Models	Chapter 1, 2 Fundamentals of Software Engineering by Rajib Mall	https://ocw.mit.edu/course/s/1-124j-foundations-of-software-engineering-fall-2000/	10

Module No	Topic	Sub Topic	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours
Module 2	Software Project Management	Software Project Management Complexities, Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO—A Heuristic Estimation Technique, Halstead’s Software Science—An Analytical Technique, Staffing Level Estimation, Scheduling, Organisation and Team Structures, Staffing, Risk Management, Software Configuration Management, Requirements Gathering and Analysis, Software Requirements Specification (SRS), Formal System Specification, Axiomatic Specification, Algebraic Specification, Executable Specification and 4GL	Chapter 3, 4 Fundamentals of Software Engineering by Rajib Mall	https://ocw.mit.edu/course/s/1-040-project-management-spring-2004/	10

Module No	Topic	Sub Topic	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours
Module 3	Software Design	Overview of the Design Process, How to Characterise a Good Software Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design, Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review	Chapter 5, 6 Fundamentals of Software Engineering by Rajib Mall	https://www.udemy.com/topic/software-design/?srsltid=AfmBOorLQmirtD4-oe4-eJGh928qyndbv_fqMKfE_CnRm1dwB2RRJpli	10

Module No	Topic	Sub Topic	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours
Module 4	Software Reliability and Quality Management	Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model, Few Other Important Quality Standards, Six Sigma, Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, Estimation of Maintenance Cost	Chapter 11, 13 Fundamentals of Software Engineering by Rajib Mall	https://extendedstudies.ucsd.edu/courses/managing-software-quality-assurance-and-testing-cse-41265	10

Detailed Lesson Plan:

3rd Year, Sec A (Faculty Name – Prof. Pradipta Roy, Prof. Mohit Das)

3rd Year, Sec B (Faculty Name – Prof. Pradipta Roy, Prof. Mohit Das)

3rd Year, Sec C (Faculty Name – Prof. Pradipta Roy, Prof. Mohit Das)

Module 1: Fundamentals of Software Engineering

Working Day	Lesson Plan Description
Day 1	Introduction
Day 2	Evolution—From an Art Form to an Engineering Discipline
Day 3	Software Development Projects

Working Day	Lesson Plan Description
Day 4	Exploratory Style of Software Development, Emergence of Software Engineering
Day 5	Notable Changes in Software Development Practices
Day 6	Computer Systems Engineering, A Few Basic Concepts
Day 7	Waterfall Model and its Extensions
Day 8	Rapid Application Development (RAD)
Day 9	Agile Development Models
Day 10	Spiral Model, A Comparison of Different Life Cycle Models.

Module 2: Software Project Management

Working Day	Lesson Plan Description
Day 11	Software Project Management Complexities
Day 12	Responsibilities of a Software Project Manager, Project Planning
Day 13	Metrics for Project Size Estimation, Project Estimation Techniques
Day 14	Empirical Estimation Techniques
Day 15	COCOMO—A Heuristic Estimation Technique
Day 16	Halstead's Software Science—An Analytical Technique
Day 17	Staffing Level Estimation, Scheduling
Day 18	Organisation and Team Structures, Staffing, Risk Management, Software Configuration Management
Day 19	Requirements Gathering and Analysis, Software Requirements Specification (SRS)
Day 20	Formal System Specification, Axiomatic Specification, Algebraic Specification, Executable Specification and 4GL.

Module 3: Software Design

**Module 4:
Management**

Working Day	Lesson Plan Description
Day 21	Overview of the Design Process
Day 22	How to Characterise a Good Software Design?
Day 23	Cohesion and Coupling
Day 24	Layered Arrangement of Modules
Day 25	Approaches to Software Design
Day 26	Overview of SA/SD Methodology
Day 27	Structured Analysis
Day 28	Developing the DFD Model of a System
Day 29	Structured Design
Day 30	Detailed Design, Design Review.

Software Reliability and Quality

Working Day	Lesson Plan Description
Day 31	Software Reliability
Day 32	Statistical Testing
Day 33	Software Quality
Day 34	Software Quality Management System, ISO 9000
Day 35	SEI Capability Maturity Model
Day 36	Few Other Important Quality Standards, Six Sigma
Day 37	Characteristics of Software Maintenance
Day 38	Software Reverse Engineering
Day 39	Software Maintenance Process Models
Day 40	Estimation of Maintenance Cost.

Learning Resources:

Text Books:				
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher	
Rajib Mall	Fundamentals of Software Engineering	5 TH Edition	Prentice Hall India Learning Private Limited	Download eBook
Reference Books:				
Roger S. Pressman	Software Engineering: A Practitioner's Approach	6 TH Edition	McGrawHill Series in Computer Science	Download eBook
Ian Sommerville	Software Engineering	9 th Edition	Pearson	Download eBook

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3				2						
CO2			3	2								
CO3			3	2								
CO4		2									3	

3: Strong correlation 2: Medium correlation 1: Weak correlation

PSO	PSO Description
PSO1	Technical Knowledge and Problem-Solving: Apply fundamental concepts of computer applications, programming languages, data structures, algorithms, and database management to analyse and solve computational problems effectively.

PSO	PSO Description
PSO2	Software Design and Development: Demonstrate the ability to design, develop, test, and deploy software solutions by utilizing modern tools, technologies, and logical programming skills for real-world applications across domains such as web, mobile, and enterprise systems.
PSO3	Professional Skills and Ethics: Exhibit effective communication, teamwork, leadership, and ethical practices while adapting to emerging IT trends, thereby contributing responsibly to societal and organizational development.

QUESTION PAPER PATTERN AND DATES:

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Syllabus and Lesson Plan

Subject Name: **Introduction to Cloud Computing and Visualization**

Credit: 4

Lecture Hours: 40

Subject Code: **BCACL502**

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Prof. Kaustav Nandy

Pre-requisite: Basics of Computer fundamentals and networking

Relevant Links:

1. Link for Study Material:

<https://drive.google.com/file/d/1htT7Qr-5kQfmgSJjvfJnrYBMuYj81Szp/view?usp=sharing>

2. Link for NPTEL Course:

https://onlinecourses.nptel.ac.in/noc24_cs118/preview

3. Link for Coursera Course:

<https://www.coursera.org/search?query=cloud%20computing%20>

4. Link for LinkedIn Learning Course:

<https://www.linkedin.com/learning/search?keywords=Cloud%20Computing&u=229219690>

COURSE OBJECTIVES:

1. Understand the principles of cloud computing.
2. Understanding SaaS, PaaS etc.
3. To gain knowledge of applications of cloud computing.
4. To understand cloud computing platforms.

COURSE OUTCOMES:

CO1: Understand the fundamentals and foundations of Cloud Computing.

CO 2 Idea about the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.

CO 3: Understand the key concepts of virtualization and use of hypervisors, explain the core issues of cloud computing such as security, privacy, etc.

CO 4: Gain knowledge about the different Cloud computing services and cloud service providers, Gain knowledge about cloud servers and cloud storage technologies, relevant distributed file systems, NoSQL databases and object storage.

Module No	Topic	Sub Topic	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours
Module 1:	Introduction	Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud , Cloud Computing Reference Model , Characteristics and Benefits, Distributed Systems, Virtualization, Web 2.0 , Service Oriented Computing, Utility Oriented Computing, Eras of Computing, Parallel vs Distributed Computing , Elements of Parallel Computing , , Hardware Architectures of Parallel Processing , Approaches to Parallel Programming , Levels of Parallelism , Laws of Caution , Elements of Distributed Computing , Architectural Styles for Distributed Computing , Models for Inter Process Communication , Technologies for Distributed Computing , Remote Procedure	Mastering Cloud Computing : Foundations and Application Programming (Buyya, Vecciola and Selvi), Chapter 1, Introduction , Chapter 4: Cloud Computing Architecture	International Academia: https://aws.amazon.com/free/ Industry Mapping: Aneka	10

		Call ,Distributed Object Framework ,Service Oriented Computing			
Module 2:	Virtualization	Characteristics of Virtualized Environments, Execution Virtualization, Other types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, IAAS, PAAS, SAAS Types of Clouds, and Security	Mastering Cloud Computing: Foundations and Application Programming (Buyya, Vecciola and Selvi), Chapter 2 : Principles of Parallel and Distributed Computing, Chapter 3: Virtualization	International Academia: https://aws.amazon.com/free/ Industry Mapping: Aneka	14
Module 3:	Principles of Parallel and Distributed Computing	Concurrent Computing with Thread Programming, High-throughput Computing and Data-Intensive Computing, Programming applications with Threads, Thread API, Parallel computation with Threads, Task computing, Task Computation with High-Throughput, Task Introduction, Frameworks for Task computing, Task-based application model, Data-intensive computing Characteristics	Mastering Cloud Computing : Foundations and Application Programming (Buyya, Vecciola and Selvi), Chapter 6: Concurrent Computing, Chapter 7 High-Throughput Computing, Chapter 8: Data-Intensive Computing	International Academia: https://aws.amazon.com/free/ Industry Mapping: Aneka	10
Module 4:	Edge, Fog computing and application of cloud of computing	Edge computing, Fog computing, Cloud Platforms and Applications, Overview on Amazon Web Services (AWS), Overview of Google Cloud Platform (GCP), Overview of Microsoft Azure Cloud, Cloud applications in scientific, business and consumer domain	Mastering Cloud Computing : Foundations and Application Programming (Buyya, Vecciola and Selvi), Chapter 9: Cloud Platforms in Industry	International Academia: https://aws.amazon.com/free/ Industry Mapping: Aneka	10
					40

Module 1: Introduction:

3rd Year, Sec A (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

3rd Year, Sec B (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

Working Day	Lesson Plan Description
Day 1	Cloud Computing at a Glance, The Vision of Cloud Computing,
Day 2	Defining a Cloud , Cloud Computing Reference Model ,
Day 3	Characteristics and Benefits,
Day 4	Distributed Systems, Virtualization, Web 2.0,
Day 5	Service Oriented Computing, Utility Oriented Computing,
Day 6	Eras of Computing, Parallel vs Distributed Computing,
Day 7	Elements of Parallel Computing,
Day 8	Hardware Architectures of Parallel Processing ,
Day 9	Approaches to Parallel Programming ,Levels of Parallelism ,
Day 10	Laws of Caution, Elements of Distributed Computing,

Module 2: Virtualization:

3rd Year, Sec A (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

3rd Year, Sec B (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

Working Day	Lesson Plan Description
Day 11	Architectural Styles for Distributed Computing, Models for Inter Process Communication,
Day 12	Technologies for Distributed Computing, Remote Procedure Call,
Day 13	Distributed Object Framework ,
Day 14	Service Oriented Computing
Day 15	Characteristics of Virtualized Environments,
Day 16	Execution Virtualization, Other types of Virtualization,
Day 17	Virtualization and Cloud Computing,
Day 18	Pros and Cons of Virtualization,
Day 19	IAAS, PAAS, SAAS
Day 20	Types of Clouds, and Security

Module 3: Principles of Parallel and Distributed Computing:

3rd Year, Sec A (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

3rd Year, Sec B (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

Working Day	Lesson Plan Description
Day 21	Concurrent Computing with Thread Programming,
Day 22	High-throughput Computing and Data-Intensive Computing,
Day 23	Programming applications with Threads,
Day 24	Thread API,
Day 25	Parallel computation with Threads,
Day 26	Task computing, Task Computation with High-Throughput,
Day 27	Task Introduction, Frameworks for Task computing,
Day 28	Task-based application model,
Day 29	Data-intensive computing Characteristics
Day 30	Data-intensive computing Characteristics

Module 4: Edge, Fog computing and application of cloud of computing

3rd Year, Sec A (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

3rd Year, Sec B (Faculty Name – Prof. Jayant Paul, Dr. Monoj Kumar Muchahari)

Working Day	Lesson Plan Description
Day 31	Edge computing,
Day 32	Fog computing,
Day 33	Cloud Platforms and Applications,
Day 34	Overview on Amazon Web Services (AWS),
Day 35	Overview on Amazon Web Services (AWS),
Day 36	Overview of Google Cloud Platform (GCP),
Day 37	Overview of Microsoft Azure Cloud,
Day 38	Overview of Microsoft Azure Cloud,
Day 39	Cloud applications in scientific,
Day 40	business and consumer domain

TEXT BOOK:

1. “Mastering Cloud Computing: Foundations and Application Programming (Buyya, Vecciola and Selvi)”, (Module-1, Module- 2, Module-3, Module- 4)

REFERENCE BOOKS:

1. “Cloud Computing”, Aravind Doss Second Edition, Tata McGraw Hill.

CO- PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1:	3	2	2	0	0	2	0	0	0	0	0	0
CO2:	3	3	3	0	2	2	2	0	0	0	0	1
CO3:	3	2	3	3	2	2	1	1	1	0	0	1
CO4:	3	2	2	2	3	1	1	0	0	1	1	1

PSO	PSO Description
PSO1	Technical Knowledge and Problem-Solving: Apply fundamental concepts of computer applications, programming languages, data structures, algorithms, and database management to analyse and solve computational problems effectively.
PSO2	Software Design and Development: Demonstrate the ability to design, develop, test, and deploy software solutions by utilizing modern tools, technologies, and logical programming skills for real-world applications across domains such as web, mobile, and enterprise systems.
PSO3	Professional Skills and Ethics: Exhibit effective communication, teamwork, leadership, and ethical practices while adapting to emerging IT trends, thereby contributing responsibly to societal and organizational development.

QUESTION PAPER PATTERN AND DATES

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Mid Term 1	August 10, 2026- August 18, 2026	Attempt 5 out of 10 questions; Each question carries 2 marks (2×5)	Attempt 2 out of 4 questions; Each question carries 5 marks (5×2)	Attempt 1 out of 2 questions; Each question carries 10 marks (10×1)	30
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University of Engineering and Management
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Institute of Engineering & Management, New Town Campus
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Syllabus and Lesson Plan

Subject Name: **Introduction to Cyber Security**

Credit: 4

Lecture Hours: 40

Subject Code: **BCACS502**

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Sucheta Chandra

Pre-requisite: Knowledge of basic data communication and network security.

Relevant Links:

1. Link for Study Material: [StudyMatCyberSecuritySC_MS.docx - Google Docs](#)

2. Link for Coursera Course:

[Google Cybersecurity Professional Certificate | Coursera](#)

3. Link for LinkedIn Learning Course:

[Understanding the cybersecurity frameworks and standards - Cybersecurity Foundations Video Tutorial | LinkedIn Learning, formerly Lynda.com](#)

4. NPTEL Course:

[Cyber Security and Privacy - Course](#)

COURSE OBJECTIVES:

Throughout the course, students will be expected to understand the concept of Cyber Security by :

1. Developing an overall understanding of defending data in cyberspace
2. Developing an understanding of different protocols, cyber crimes, cyber laws and vulnerabilities in digital world.
3. Developing an understanding of how to stay secure amidst cyber threats and malware attacks.

COURSE OUTCOMES:

- CO1:** Understand the various concepts of underlying computer network and probable threats
CO2: Apply these techniques in applications to see the real-life security mechanisms in the cyber world.
CO3: Explain the role of anti-malware programs in combating cyber threats.
CO4: Acquire the basic knowledge of real-world hacking

Module number	Topic	Sub-topics	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours
1	Module 1: Network Layer and Application Layer	IPv4 Addresses, IPv6 Addresses, Network layer: Delivery, Forwarding and Delivery, Delivery, forwarding, unicast routing protocols, multicast routing protocols, Remote logging, electronic mail and file transfer, Remote logging, Electronic mail, File transfer, WWW and HTTP	Fundamentals of Cyber Security By Manyank Bhusan Chapter 1,2,3	<i>International Standards:</i> Computer Networks Electrical Engineering and Computer Science MIT OpenCourseWare <i>Industry Mapping:</i> Wireshark	10
2	Module 2: Cryptography and Network Security	Cryptography, Symmetric Key cryptography, Asymmetric Key cryptography, Network Security, Security Service :Message Confidentiality, Message Integrity, Message Authentication, Digital Signature, Entity Authentication, Key Management	Book – Fundamentals of Cyber Security By Manyank Bhusan Chapter 3,4,5	<i>International Standards:</i> Cryptography and Cryptanalysis Electrical Engineering and Computer Science MIT OpenCourseWare <i>Industry Mapping:</i> NMap	10

3	Module 3: Introduction to Cyber Security	Information Security: What is Security? Why Information Security is Important? Threats to Information systems, Security Threat Source, Internal threats, External Threats, Cyber Security and Security risk analysis Application Security: Database security, E-mail Security Internet Security Security Threats Virus, Worms, Trojan Horse, Bombs, Trap Door E-mail spoofing E-mail Virus, Virus Life-Cycle, How Virus Works? Macro Viruses, Malicious Software, Network and Services Attack Denial-of-Service Attack, Types of DOS Attacks Methods of attacks.	Book – Fundamentals of Cyber Security By Manyank Bhutan Chapter 5,6	International Standards: Computer Systems Security Electrical Engineering and Computer Science MIT OpenCourseWare Industry Mapping: Bitdefender, Norton 360, McAfee, Avira	10
4	Module 4: Information Security Standards	What is ISO?, IT Act 2000 Copyright, Patent, Intellectual Property Rights Cyber Laws in India, Software Licensing Introduction to Ethical Hacking Ethics Terminology, The Ethical Hacker, Security and Hacking Foundation of Security – C.A.I.A, Phases of Ethical Hacking, Hacking Technologies, Phase of Ethical Hacking: Reconnaissance, Scanning, Gaining Access Maintaining Access Covering Tracks, Hacker Classes: Black Hats, White Hats, Gray Hats	Book – Fundamentals of Cyber Security By Manyank Bhutan Chapter 8	International Standards: Law and Policy Social and Ethical Responsibilities of Computing (SERC) MIT OpenCourseWare Industry Mapping: NMap, Advanced IP Scanner	10

Learning Resources:

Text Books:				
Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher	
Behrouz A. Forouzan.	Data Communications & Networking	4th Edition	Tata McGraw- Hill	
Mayank Bhushan	Fundamentals of Cyber Security	NA	BPB Publications.	
Reference Books:				
William Manning.	Certified Ethical Hacker Certification Exam	ISBN: 9781447611059, 9781447611059	Lulu.com	William Manning.

Module 1: Network Layer and Application Layer

3rd Year, Sec B (Faculty Name – Sucheta Chandra,)

Working Days	Lesson Plan Description
Day 1	IPv4 Addresses
Day 2	IPv6 Addresses
Day 3	Network Layer: Delivery
Day 4	Network Layer: Forwarding
Day 5	Network Layer: Forwarding and Delivery
Day 6	Unicast Routing Protocols
Day 7	Multicast Routing Protocols
Day 8	Remote Logging
Day 9	Electronic Mail (Email)
Day 10	File Transfer
Day 11	World Wide Web (WWW)
Day 12	Hypertext Transfer Protocol (HTTP)

Module 2: Cryptography and Network Security

3rd Year, Sec B (Faculty Name – Sucheta Chandra,)

Working Days	Lesson Plan Description
Day 13	Cryptography
Day 14	Symmetric Key Cryptography
Day 15	Asymmetric Key Cryptography
Day 16	Network Security
Day 17	Security Service: Message Confidentiality
Day 18	Security Service: Message Integrity
Day 19	Security Service: Message Authentication
Day 20	Digital Signature
Day 21	Entity Authentication
Day 22	Key Management

Module 3: Introduction to Cyber Security

3rd Year, Sec B (Faculty Name – Sucheta Chandra,)

Working Days	Lesson Plan Description
Day 23	Information Security Overview: What is Security?
Day 24	Information Security Overview: Why Information Security is Important?
Day 25	Information Security Overview: Cyber Security terms
Day 26	Security Risk Analysis
Day 27	Application Security: Database Security
Day 28	Application Security: Email Security
Day 29	Application Security: Internet Security
Day 30	Application Security: Security Threats
Day 31	Types of Malware and Attacks: Virus
Day 32	Types of Malware and Attacks: Worms
Day 33	Types of Malware and Attacks: Trojan Horse
Day 34	Types of Malware and Attacks: Logic Bombs (aka Bombs)
Day 35	Types of Malware and Attacks: Trap Doors
Day 36	Email Spoofing

Day 37	Email Virus
Day 38	Virus Life Cycle
Day 39	How Virus Works?
Day 40	Macro Viruses
Day 41	Malicious Software
Day 42	Network and Services Attacks

Module 4: Information Security Standards

3rd Year, Sec B (Faculty Name – Sucheta Chandra)

Working Days	Lesson Plan Description
Day 43	Information Security Standards and Cyber Laws: What is ISO?
Day 44	Information Security Standards and Cyber Laws: IT Act 2000
Day 45	Copyright, Patent, Intellectual Property Rights
Day 46	Cyber Laws in India: Software Licensing
Day 47	Introduction to Ethical Hacking: Ethics Terminology, The Ethical Hacker
Day 48	Security and Hacking: Foundation of Security – C.I.A.A (Confidentiality, Integrity, Availability, Authenticity), Phases of Ethical Hacking, Hacker Classes (Black Hats, White Hats, Gray Hats)

TEXTBOOK: 1. **Fundamentals of Cyber Security, Mayank Bhushan**
2. **Data Communications & Networking, Behrouz A. Forouzan.**

REFERENCEBOOKS:

Certified Ethical Hacker Certification Exam, William Manning.

CO- PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	3	1	3	0	0	3	0	1	3
CO2	3	3	3	3	3	3	0	0	2	0	2	2
CO3	3	3	2	2	3	3	0	3	1	0	2	3
CO4	3	3	3	3	3	2	3	3	2	0	1	3

3: Strong correlation 2: Medium correlation 1: Weak correlation

PSO	PSO Description
PSO1	Technical Knowledge and Problem-Solving: Apply fundamental concepts of computer applications, programming languages, data structures, algorithms, and database management to analyse and solve computational problems effectively.
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University of Engineering & Management, Jaipur



Syllabus and Lesson Plan

Subject Name: **Introduction to web development
using PHP and MySQL**

Credit: 4

Lecture Hours: 40

Subject Code: **BCAWP502**

Maximum: 100 marks (Internal: 30 marks; External: 70 marks)

List of Faculty Members handling the Subject –

1. Piyali Bhanja

Pre-requisite: Basic computer programming knowledge, fundamentals of C/C++ or any programming language, basic understanding of databases, fundamentals of the internet, familiarity with code editors (VS Code/Sublime Text)

Relevant Links:

1. Link for Study Material:

https://iemcollege-my.sharepoint.com/:f/g/personal/pritam_chakraborty_iem_edu_in/EtVTTTl5MDZChd-E2eptmw4BefQBM2hoS9_PfdRxjs0btg?e=zOIHRA

2. Link for Coursera Course:

<https://www.coursera.org/specializations/web-design>

<https://www.coursera.org/learn/introduction-html-css-javascript>

<https://www.coursera.org/learn/introduction-to-front-end-development>

<https://www.coursera.org/specializations/html-css-javascript-for-web-developers>

<https://www.coursera.org/learn/packt-intro-to-php-v4qa1>

<https://www.coursera.org/projects/mysql-with-php>

3. Link for LinkedIn Learning Course:

<https://www.linkedin.com/learning/introduction-to-web-design-and-development-14628245>
<https://www.linkedin.com/learning/html-css-and-javascript-building-the-web>
<https://www.linkedin.com/learning/php-with-mysql-essential-training-2-build-a-cms>

Course Objectives:

1. To understand the fundamental concepts of web technologies, including HTML, CSS, JavaScript, and their role in web development.
2. To develop responsive and interactive web applications using modern frameworks.
3. To design server-side applications using back-end technologies.
4. To develop database-driven web applications using MySQL.

Course Outcomes:

CO1: Students will be able to understand the core concepts of web technologies, including HTML, CSS, and JavaScript, and their role in front-end development.

CO2: Students will be able to design responsive and interactive web interfaces using modern frameworks.

CO3: Students will be able to develop server-side applications using PHP.

CO4 : Students will be able to develop database driven applications using MySQL.

Module number	Topic	Sub-topics	Chapter Name and Book	Mapping with Industry and International Academia	Lecture Hours
1	Web Fundamentals	How the Internet works (HTTP/HTTPS, DNS, TCP/IP basics), Client-Server Architecture, Web Browsers and their components (rendering engines, developer tools), Web Servers overview (Apache, Nginx), Introduction to Web Hosting and Domains, Basic Networking Concepts for Web System Components, OS Services, System calls, System Programs, System Structure	Internet & World Wide Web: How to Program; P.J. Deitel, Pearson (Chapter 1) Reference: Fundamental of Web Development, Randy Connolly, Ricardo Hoar, Pearson	International Academia: (https://ocw.mit.edu/courses/6-170-software-studio-spring-2013/resources/mit6_170s13_04-web-srvrs/) Industry Mapping: Docker, Microsoft Azure	6

2	HTML, CSS & JavaScript Fundamentals	HTML5: Document structure, tags, attributes, Forms, tables, semantic elements, Multimedia embedding. CSS3: Selectors, box model, positioning Flex box and Grid layouts, Responsive design with Media Queries, CSS variables and animations. JavaScript basics (variables, operators, functions), DOM manipulation and events, form validation basics	Internet & World Wide Web: How to Program; P.J. Deitel, Pearson (Chapter 2,3) Internet & World Wide Web: How to Program; P.J. Deitel, Pearson (Chapter 4,5) Internet & World Wide Web: How to Program; P.J. Deitel, Pearson (Chapter 6,7,8,9,10,11,12) Reference: Fundamental of Web Development, Randy Connolly, Ricardo Hoar, Pearson	International Standards: (https://ocw.mit.edu/courses/6-170-software-studio-spring-2013/pages/lecture-notes/) IndustryMapping: Docker, Microsoft Azure, AWS, VxWorks	14
3	PHP Programming Fundamentals and MySQL basics	Features and advantages of PHP, Embedding PHP in HTML, PHP syntax and variables, Data types and operators, control structures, functions and arrays, string and date handling, form handling. Introduction to MySQL (environment, creating databases and tables, data types and constraints), SQL commands and concepts.	Internet & World Wide Web: How to Program; P.J. Deitel, Pearson (Chapter 19) Internet & World Wide Web: How to Program; P.J. Deitel, Pearson (Chapter 18) Reference:	International Standards: (https://ocw.mit.edu/courses/6-170-software-studio-spring-2013/pages/lecture-notes/) IndustryMapping: Docker, Microsoft Azure, AWS, VxWorks	12

			Fundamental of Web Development, Randy Connoly, Ricardo Hoar, Pearson Learning PHP, MySQL & JavaScript, Robin Nixon, Pearson		
4	Dynamic web application development	Connecting PHP with MySQL – database connectivity, executing SQL queries using PHP. Sessions in PHP, cookies and user preferences, session security basics. CRUD application development, debugging PHP applications. Introduction to hosting and deployment (localhost vs live server, domain and hosting basics, deploying PHP applications)	Internet & World Wide Web: How to Program; P.J. Deitel, Pearson (Chapter 19) Reference: Fundamental of Web Development, Randy Connoly, Ricardo Hoar, Pearson Learning PHP, MySQL & JavaScript, Robin Nixon, Pearson	International Standards: (https://ocw.mit.edu/courses/6-170-software-studio-spring-2013/pages/lecture-notes/) IndustryMapping: Docker, Microsoft Azure, AWS, VxWorks	8

Module 1: Web Fundamentals

3rd Year, Sec C (Faculty Name – Piyali Bhanja)

Working Day	Lesson Plan Description
Day 1	Introduction to how the Internet works

Day 2	HTTP/HTTPS, DNS, TCP/IP basics
Day 3	Client-Server Architecture
Day 4	Web Browsers and their components (rendering engines, developer tools)
Day 5	Web Servers overview (Apache, Nginx),
Day 6	Introduction to Web Hosting and Domains
Day 7	Basic Networking Concepts for Web System Components, OS Services, System calls, System Programs, System Structure

Module 2: HTML, CSS & JavaScript Fundamentals

3rd Year, Sec C (Faculty Name – Piyali Bhanja)

Working Day	Lesson Plan Description
Day 8	HTML5: Document structure, tags, attributes
Day 9	HTML5: Document structure, tags, attributes
Day 10	Forms, tables
Day 11	Semantic elements, Multimedia embedding
Day 12	CSS3: Selectors, box model
Day 13	Positioning Flex box and Grid layouts
Day 14	Responsive design with Media Queries
Day 15	CSS variables and animations.
Day 16	Hands on Development of Static Website using HTML, CSS
Day 17	JavaScript basics (variables, operators, functions)
Day 18	JavaScript basics (variables, operators, functions)
Day 19	Loop concept using JavaScript, Control Parameters (if, else, else-if)
Day 20	Introducing Function, Custom Function & Scope
Day 21	Logical Operators
Day 22	DOM manipulation and events
Day 23	DOM manipulation and events
Day 24	Form validation

Module 3: PHP Programming Fundamentals and MySQL basics

3rd Year, Sec C (Faculty Name – Piyali Bhanja)

Working Day	Lesson Plan Description
Day 25	Introduction to PHP, Embedding PHP in HTML
Day 26	Syntax and variables
Day 27	Data types and operators
Day 28	Control structures
Day 29	Control structures
Day 30	Functions
Day 31	Initializing and manipulating Arrays
Day 32	String processing, date handling
Day 33	Form handling and processing
Day 34	Introduction to MySQL – setting up
Day 35	Creating databases and tables in MySQL
Day 36	Data types and constraints
Day 37	SQL commands and concepts
Day 38	SQL commands and concepts

Module 4: Dynamic web application development

3rd Year, Sec C (Faculty Name – Piyali Bhanja)

Working Day	Lesson Plan Description
Day 39	Connecting PHP with MySQL
Day 40	Executing SQL queries with PHP
Day 41	Sessions in PHP
Day 42	Using cookies and user preferences
Day 43	Basic of session security
Day 44	CRUD application development

Day 45	CRUD application development
Day 46	Debugging PHP applications
Day 47	Localhost vs live server, domain and hosting basics
Day 48	Deploying PHP applications

TEXT BOOK:

1. **Internet & World Wide Web: How to Program; P.J. Deitel, Pearson**

REFERENCE BOOKS:

1. **Fundamental of Web Development, Randy Connolly, Ricardo Hoar, Pearson**
2. **Learning PHP, MySQL & JavaScript, Robin Nixon, Pearson**

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