Nutan Maharashtra Vidya Prasarak Mandal's (NMVPM's)

NUTAN MAHARASHTRA INSTITUTE OF ENGINEERING AND TECHNOLOGY (NMIET)

An

Autonomous Institute

Affiliated to Savitribai Phule Pune University

Governing
Post Graduation (MBA) Program

First Year of Master of Business Administration
Artificial Intelligence
(With effect from Academic Year 2025 – 27)

Nutan Maharashtra Vidya Prasarak Mandal's (NMVPM's)

NUTAN MAHARASHTRA INSTITUTE OF ENGINEERING AND TECHNOLOGY (NMIET)

An Autonomous Institute from 2025-26

Under Administrative Support - Pimpri Chinchwad Education Trust (PCET)

ESTD : 1906

Course Approval Summary – Board of Studies (MBA)

Sl. No.	Approved By	Signature and Stamp / Authority
1	Chairman, Board of Studies, MBA	HEAD OF THE DEPARTMENT Master Of Business Administration Nutan Maharashtra Inst Of Engg & Tech Talegaon Dabhade, Pune - 410 507
2	Secretary, Academic Council, NMIET, Pune	
3	Chairman, Academic Council, NMIET, Pune	Director Nutan Maharashtra Institute of Engineering & Technology Talegaon Dabhade - 410507

CURRICULUM FRAMEWORK

List of Abbreviations

Sr. No.	Abbreviation	Type of Course
1.	GC	Generic Core
2.	GC	Generic Core with Non-Credit
3.	SC	Specialization Core
4.	SE	Specialization Elective
5.	OJT	On the Job Training
6.	RP	Research Project

Course Wise Credit Distribution

Sr.No	Abbreviation	Type of Course	No. of Courses		Total Course	Credits	
			III Sem	IV Sem		Credit Points	% of Credits
1	GC	Generic Core	1	2	3	8	15%
I	GC	Generic Core with Non-Credit	1	-	1	0	0%
2	SC	Specialization Core	1	1	2	6	12%
i.	SC OJT	On Job Training	1	-	1	8	15%
ii.	SC RP	Research Project	-	1	1	6	12%
3	SE	Specialization Elective	4	4	8	24	46%
Total			8	8	16	52	100%

ASSESSMENT PARAMETERS

Continuous Assessment (CA) Parameters					
Parameter	**Attendance & Overall Conduct**	**Assignment**	**Group Presentation**	**Case Study Presentation**	**Field Project**
Marks (25)	**5**	**5**	**5**	**5**	**5**

Summative Assessment (SA) Parameters					
Course Credits	**Formative Assessment (FA)**		**Summative Assessment (SA) / Practical**	**Oral / Viva Voce**	**Total Marks**
	Unit Test (UT)	**Continuous Assessment (CA)**			
3 Credit Course	25 Marks	25 Marks	50 Marks	--	**100 Marks**
2 Credit Course	10 Marks	10 Marks	30 Marks	--	**50 Marks**
6 Credit Course	--	100 Marks	--	50 Marks	**150 marks**
OJT Credit (8 Credit)	--	100 Marks	--	100 Marks	**200 Marks**
Audit Course (0 Credit)	--	--	--	--	**Pass/ Not Pass**

CURRICULUM STRUCTURE
Second Year MBA-SEM-III- (Artificial Intelligence)

Type	Sem Code	Course Code	Course	Credits	Examination Schemes				Teaching Scheme [L,T,P]				Marks
					Theory								
					FA(50)		SA(50)	PR	TOTAL				
					UT (25)	CA (25)	TH		L	T	P	TOT	TOTAL
Mandatory	GC – 14	MB25GC-301	Strategic Management	3	25	25	50	-	2	1	1	4	100
Mandatory	GC – 15	MB25GC-302	Cyber Security	Audit Course (0 Credit)									AC/NC
Mandatory	SC – 01	MB25SCAI-303	Python	3	-	-	50	50	2	1	1	4	100
CORE TOTAL			**3**	**6**	**25**	**25**	**100**	**50**	**4**	**2**	**2**	**8**	**200**
Mandatory	OJT (SC)	MB25OJTAI-304	On the Job Training	8	0	100	0	100	0	2	14	16	200
SIP TOTAL			**1**	**8**	**0**	**100**	**0**	**100**	**0**	**2**	**14**	**16**	**200**
Semester III Specialization Electives - Any 4 Courses to be Opted from the respective elective list													
Elective	SE 01	MB25SEAI-305	Structured Query Language	3	-	-	50	50	2	1	1	4	100
Elective	SE 02	MB25SEAI-306	Introduction to Machine Learning	3	-	-	50	50	2	1	1	4	100
Elective	SE 03	MB25SEAI-307	Artificial Intelligence and its Applications	3	25	25	50	-	2	1	1	4	100
Elective	SE 04	MB25SEAI-308	Data Visualization	3	-	-	50	50	2	1	1	4	100
Elective	SE 05	MB25SEAI-309	Big Data Analytics and Cloud Computing	3	-	-	50	50	2	1	1	4	100
Elective	SE 06	MB25SEAI-310	Block Chain and Crypto Currency	3	25	25	50	-	2	1	1	4	100
GENERIC ELECTIVE TOTAL			**4**	**12**	**25**	**25**	**200**	**150**	**8**	**4**	**4**	**16**	**400**
SEMESTER TOTAL			**8**	**26**	**150**	**250**	**400**		**12**	**8**	**20**	**40**	**800**

L-Lecture, T-Tutorial, P-Practical, UT-Unit Test, FA-Formative Assessment, SA-Summative Assessment,
***Exit Policy: Available as a separate document**

CURRICULUM STRUCTURE
Second Year MBA-SEM-IV-(Artificial Intelligence)

Type	Sem Code	Course Code	Course	Credits	Examination Schemes				Teaching Scheme [L,T,P]				Marks
					Theory								
					FA(50)		SA(50)	PR	TOTAL				
					UT (25)	CA (25)	TH		L	T	P	TOT	TOTAL
Mandatory	GC – 16	MB25GC-401	Entrepreneurship, Innovation and Design Thinking	3	25	25	50	-	2	1	1	4	100
Mandatory	GC – 17	MB25GC-402	Project Management	2	10	10	30	-	1	1	1	3	50
Mandatory	SC – 02	MB25SC AI- 403	Advanced Machine Learning	3	-	-	50	50	2	1	1	4	100
CORE TOTAL			**3**	**8**	**35**	**35**	**130**	**50**	**5**	**3**	**3**	**11**	**250**
Mandatory	RP	MB25RP AI-404	Research Project	6	0	100	0	50	0	2	10	12	150
RESEARCH PROJECT TOTAL			**1**	**6**	**0**	**100**	**0**	**50**	**0**	**2**	**10**	**12**	**150**
Semester IV Specialization Electives - Any 4 Courses to be Opted from the respective elective list													
Elective	SE 07	MB25SE AI-405	Deep Learning	3	25	25	50	-	2	1	1	4	100
Elective	SE 08	MB25SE AI-406	Analytics toolkit for Decision Sciences	3	-	-	50	50	2	1	1	4	100
Elective	SE 09	MB25SE AI-407	Machine Learning & Predictive Analytics	3	-	-	50	50	2	1	1	4	100
Elective	SE 10	MB25SE AI-408	Business Intelligence	3	25	25	50	-	2	1	1	4	100
Elective	SE 11	MB25SE AI-409	Big Data Management and Security	3	25	25	50	-	2	1	1	4	100
Elective	SE 12	MB25SE AI-410	Natural Language Processing	3	25	25	50	-	2	1	1	4	100
GENERIC ELECTIVE TOTAL			**4**	**12**	**50**	**50**	**200**	**100**	**8**	**4**	**4**	**16**	**400**
SEMESTER TOTAL			**8**	**26**	**160**	**260**	**380**		**13**	**9**	**17**	**39**	**800**

L-Lecture, T-Tutorial, P-Practical, UT-Unit Test, FA-Formative Assessment, SA-Summative Assessment,
***Exit Policy: Available as a separate document**

Course Syllabus
Second Year MBA.
(Artificial Intelligence)
Semester III

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Strategic Management			Course Code	MB25GC-301			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 301.1	REMEMBERING	DESCRIBE the basic terms and concepts in Strategic Management.
CO 301.2	UNDERSTANDING	EXPLAIN the various facets of Strategic Management in a real-world context.
CO 301.3	UNDERSTANDING	DESCRIBE the trade-offs within and across strategy formulation, implementation, appraisal.
CO 301.4	APPLYING	INTEGRATE the aspects of various functional areas of management to develop a strategic perspective.
CO 301.5	ANALYSING	EXPLAIN the nature of the problems and challenges confronted by the top management team and the approaches required to function effectively as strategists.
CO 301.6	CREATING	DEVELOP the capability to view the firm in its totality in the context of its environment.

Course Contents

Unit	Description	Duration [Hrs]
I	**Understanding Strategy:** Concept of strategy, Levels of Strategy - Corporate, Business and Functional. Strategic Management - Meaning and Characteristics. Distinction between strategy and tactics, Strategic Management Process, Stakeholders in business, Roles of stakeholder in strategic management. Strategic Intent – Meaning, Hierarchy, Attributes, Concept of Vision & Mission - Process of envisioning, Difference between vision & mission. Characteristics of good mission statements. Business definition using Abell's three dimensions. Objectives and goals, Linking objectives to mission & vision. Critical success factors (CSF), Key Performance Indicators (KPI), Key Result Areas (KRA). Components of a strategic plan, Analyzing Company's External Environment: Environmental appraisal, Scenario planning – Preparing an Environmental Threat and Opportunity Profile (ETOP). Analyzing Industry Environment: Industry Analysis - Porter's Five Forces Model of competition, Entry & Exit Barriers.	(7+2)
II	**Analyzing Company's Internal Environment-** Resource based view of a firm. Analyzing Company's Resources and Competitive Position - meaning, types & sources of competitive advantage, competitive parity & competitive disadvantage. VRIO Framework, Core Competence, characteristics of core competencies, Distinctive competitiveness. Benchmarking as a method of comparative analysis. Value Chain Analysis Using Porter's Model: primary & secondary activities. Organizational Capability Profile: Strategic Advantage Profile, Concepts of stretch, leverage & fit, ways of resource leveraging – concentrating, accumulating, complementing, conserving, recovering. Portfolio Analysis: Business Portfolio Analysis – BCG Matrix – GE 9 Cell Model.	(7+2)
III	**Generic Competitive Strategies–** Meaning of generic competitive strategies, Low cost, Differentiation, Focus – when to use which strategy. Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic Alliances & Collaborative Partnerships), Retrenchment – Turnaround, Divestment, Liquidation, Outsourcing Strategies.	(7+2)

IV	**Strategy Implementation**– Barriers to implementation of strategy, Mintzberg's 5 Ps – Deliberate & Emergent Strategies. Mc Kinsey's 7s Framework. Organization Structures for Strategy Implementation: entrepreneurial, functional, divisional, SBU, Matrix, Network structures, Cellular/ Modular organization, matching structure to strategy, organizational design for stable Vs. turbulent environment, Business Continuity Planning. Changing Structures & Processes: Reengineering & strategy implementation – Principles of Reengineering. Corporate Culture: Building Learning organizations, promoting participation through technique of Management by Objectives (MBO). Strategy Evaluation: Operations Control and Strategic Control - Symptoms of malfunctioning of strategy – Concept of Balanced scorecard for strategy evaluation.	(7+2)
V	**Cost Control Techniques:** Budgetary Control & Standard Costing: Budgetary Control: Meaning of Budget and Budgeting, Importance, Advantages and Disadvantages, Cash Budget and Flexible Budget, Standard Costing: Meaning, Importance, Advantages and Disadvantages, Cost Variance Analysis. Material Variances– Material Cost Variance, Material Rate Variance, Material Usage Variance, Material Mix Variance and Material Yield Variance.	(7+2)
	Total	**45**

Suggested Textbooks:

1. Strategic Management and Business Policy by Azhar Kazmi, Tata McGraw-Hill
2. Strategic Management by Ireland, Hoskisson & Hitt, Indian Edition, Cengage Learning
3. Crafting and Executing Strategy- The Quest for Competitive Advantage by Thompson, Strickland, Gamble & Jain, Tata McGraw-Hill
4. Concepts in Strategic Management & Business Policy by Thomas L. Wheelen & J. David Hunger, Pearson

Suggested Reference Books

1. Strategic Management by Dr. Yogeshwari L. Giri
2. Competitive Strategy: Techniques for Analyzing Industries and Competitors by Michael E. Porter, First Free Press Edition
3. Competing for the Future by Gary Hamel & C.K. Prahlad,
4. Blue Ocean Strategy by Kim & Mauborgne

Suggested Online Link:

1. **https://onlinecourses.nptel.ac.in/noc24_mg112/preview**
2. **https://onlinecourses.nptel.ac.in/noc25_mg129/preview**
3. **https://www.coursera.org/learn/strategic-management**
4. **https://www.upgrad.com/advanced-program-strategic-management-business-excellence-iim-lucknow/**
5. **https://www.coursera.org/courses?query=strategic+management**

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Cyber Security			Course Code	MB25GC-302			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
0	-	-	-	-	YES	-	-	AC/NC

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 302.1	REMEMBERING	Recall and describe the phases of ethical hacking, CIA triad, cybersecurity principles, and basic security concepts.
CO 302.2	UNDERSTANDING	Explain Linux basics, virtualization setup, cloud-based virtual machines, and cybersecurity tool configuration.
CO 302.3	UNDERSTANDING	Interpret networking fundamentals, scanning techniques, network vulnerabilities, and security components like IDS/IPS and firewalls.
CO 302.4	APPLYING	Apply ethical hacking tasks such as reconnaissance, exploitation, privilege escalation, post-exploitation, OSINT, and persistence techniques..
CO 302.5	ANALYSING	Analyze web application vulnerabilities using OWASP Top 10, evaluate security flaws, and assess governance, risk, and incident response strategies

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction**: Phases of ethical hacking, Understanding the underlying principles cyber security, Understanding CIA Triads, Information Security Vs Cyber Security. **Basics of Linux:** Windows-based Setup, Installing VirtualBox or VMware for virtualization, Setting up Kali Linux as a virtual machine, Installing and configuring essential cybersecurity tools. Linux-based Setup, Using a Linux distribution as the host OS, Installing and configuring essential cybersecurity tools. Linux basic commands and filesystem architecture, Cloud-based Setup (AWS or Azure),Creating a virtual machine instance on a cloud platform. Installing Kali Linux or other distributions. Configuring cloud security policies and networking, Registration on - TryHackMe HackTheBox, PortSwigger Web Academy	(4+2)
II	**Network Hacking:** Networking Fundamentals, Understanding the fundamentals of networking. OSI and TCP/IP models. IP and MAC addresses, subnetting, and IPv4/IPv6. Introduction to routers, switches, and firewalls. Types of Viruses, worms, and trojan horses and how they spread through the network. Role of Firewalls and Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS). Secure Network architecture and design principles, **Network Sniffing:** Packet capturing and analysis with Wireshark and TCP Dump. **Scanning and Reconnaissance:** Network scanning with Nmap, Network Vulnerability Assessment with Nessus, Identifying open ports, services, and potential vulnerabilities. **Initial Foothold:** Phishing attacks and email-based threats, Exploiting software vulnerabilities, social engineering techniques. **Privilege Escalation:** Windows Privilege Escalation Linux Privilege Escalation Cheetsheets and Payloads. **Post Exploitation:** Post Exploitation Tools and frameworks Creating backdoors and maintaining control Deleting digital Footprints, File system manipulation and data exfiltration, Techniques for maintaining access and evading detection. Concept of Persistence.	(4+2)
III	**OSINT (Open-Source Intelligence Techniques):** Information Gathering Tools and Techniques for OSINT of - Website, mail, FaceBook Instagram Twitter, Phone Number, Data Leak Lookups,	(4+2)

IV	**Web Application Security:** Web Application Fundamentals and Lab Setup: Web App Technologies Basics (HTML, CSS and JS) Client Server Model, Burp Suite Installation, Burp Suite Proxy Setup and Practical, **OWASP Top 10:** Broken Access Control SQL Injection, Cross Site Scripting XML External Entity, Security Misconfiguration - Access Control Vulnerabilities Vulnerable and Outdated Component Vulnerabilities, Authentication Vulnerabilities, Server Side Request Forgery, Business Logic Vulnerabilities Session Management Vulnerabilities **Automation Testing for Web Apps** Practical of Tools - ZAP, Nikto, Nuclei.	**(4+2)**
V	**Cybersecurity Governance, Risk, and Strategy for Business Leaders:** Cybersecurity as a Business Imperative Risk Management Frameworks Security Policies & Compliance, **Incident response and decision making:** Incident Response & Business Continuity Strategic Decision-Making	**(4+2)**
	Total	**30**

Suggested Textbooks:

1. Principles of Information Security (7th Edition), Authors: Michael E. Whitman & Herbert J. Mattord, Publisher: Cengage Learning, Edition: 7th Edition (2023)
2. Cryptography and Network Security: Principles and Practice, Author: William Stallings, Publisher: Pearson, Edition: 8th Edition (latest widely adopted)
3. Cybersecurity: With Cryptography Essentials, Authors: Shishir Kumar Shandilya, Agni Datta & Bong Jun Choi, Publisher: McGraw Hill / Higher Education Press, Edition: 1st Edition (2025)

Suggested Reference books:

1. Security in Computing, Authors: Charles P. Pfleeger, Shari Lawrence Pfleeger & Jonathan Margulies, Publisher: Pearson Education, Edition: 6th Edition (2023)
2. Information Security: Principles and Practice, Author: Mark Stamp, Publisher: Wiley India, Edition: 3rd Edition (2023)
3. cryptography, Network Security, and Cyber Laws, Authors: Bernard L. Menezes & Ravinder Kumar, Publisher: Cengage Learning India Private Limited, Edition: 1st Edition (2018)

Suggested Online Link:

1. https://nptel.ac.in/courses/106105031
2. https://nptel.ac.in/courses/106106248
3. https://www.coursera.org/learn/crypto
4. https://www.coursera.org/learn/information-security-foundations

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Python			Course Code		MB25SCAI-303		
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 303.1	REMEMBERING	Recall key Python concepts and basic programming syntax.
CO 303.2	UNDERSTANDING	Explain Python data types, flow control, and file operations.
CO 303.3	APPLYING	Implement Python programs for data handling and logic building.
CO 303.4	ANALYSING	Analyze data structures like lists, tuples, dictionaries, and sets.
CO 303.5	EVALUATING	Evaluate Python functions and their applications in data-driven decision-making.
CO 303.6	CREATING	Develop Python programs using core Python and data manipulation libraries (NumPy, Pandas).

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction to Python Programming:** Introduction, History of Python, Python, Python Features, Applications in Various Domains, Introduction to IDEs- Jupyter Notebook, VS Code, Python installation and setup, Python interpreter, script execution, Dir and help: Getting help from the Python interpreter, Python basics: variables, keywords, literals, Multi-Line Statements, Quotation, Comments, line and indentation, Input/output functions, Operators: arithmetic, comparison, logical, identity, membership.	(7+2)
II	**Python Data Types & Loop Structures:** Mutable vs Immutable data types, data types: - Number, Strings: creation, manipulation, operations, Lists and Tuples: properties, operations, indexing, Dictionaries: key-value pairs, updating, deleting elements, Sets: properties, operations, uniqueness, Type conversions and casting between data types , Flow control: conditional statements - if, if-else, if-elif- else, loops - for, while, Loop control statement: continue, break and pass, python list comprehension..	(7+2)
III	**Functions and Functional Programming:** Introduction To Functions, Defining and calling functions, Arguments, python 'Self' as default argument , Functions With Multiple Arguments, return values, range() function, , Objects, Generators, Decorators, Scope -Global Scope, Local Scope ,Nested Scope, Anonymous functions (lambda), map(), filter(), reduce(), Date & Time functions: datetime, timedelta, date, time classes	(7+2)
IV	**File Handling and I/O Operations:** Introduction to Files , types of files, Keyboard I/O operations, File handling modes: opening, reading, writing, closing files, Working with CSV and Excel files using Python, error handling in file operations, File and directory-related operations, pickle module.	(7+2)
V	**Introduction to Python Libraries for Analytics:** Overview of analytical tasks and role of libraries, Introduction to the data analysis workflow, **NumPy:** creating arrays, array operations, **Pandas:** Series, Data Frame creation, indexing, and data manipulation, Data cleaning workflows , **matplotlib, seaborn, scikit-learn**, Use of Python in basic data analysis tasks. API Integration basics - Introduction	(7+2)
	TOTAL	45

Suggested Textbooks:

1. Mattan Griffel & Daniel Guetta, Python for MBAs, Columbia University Press
2. Think Python , Oreilly Allen B. Downey
3. Let Us Python, Yashwant Kanetkar and Aditya Kanetkar

Suggested Reference Books

1. Learning Python, Mark Lutz, O'Reilly Media
2. Introducing Python-Modern Computing in Simple Packages , Bill Lubanovic
3. Python for Data Analysis, Wes McKinney, O'Reilly Media

Suggested Online link:

1. https://nptel.ac.in/courses/106106145
2. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview
3. https://www.coursera.org/learn/python
4. https://www.coursera.org/specializations/python

Program	MBA (Artificial Intelligence)			Semester: III				
Course	On The Job Training (OJT)			Course Code	MB25OJTAI-304			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
8	0	2	14	00	100	-	100	200

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 304.1	REMEMBERING	IDENTIFY and DESCRIBE the fundamental aspects of the organization and industry where the OJT is conducted, including the company's profile, core business activities, and organizational structure.
CO 304.2	UNDERSTANDING	EXPLAIN the relevance and application of theoretical concepts learned in the classroom to real-world business practices observed during the OJT
CO 304.3	APPLYING	UTILIZE relevant theoretical knowledge and technical skills in real-world tasks and projects during the OJT in a professional setting
CO 304.4	ANALYSING	EXAMINE and break down the problems or tasks undertaken during the OJT, identifying the key issues, underlying causes, and possible solutions.
CO 304.5	EVALUATING	ASSESS the effectiveness of the strategies and solutions implemented during the OJT, from the standpoint of utility to the host organization, the feedback from the industry mentor.
CO 304.6	CREATING	DEVELOP a comprehensive OJT report and presentation that integrates the learning experiences, data collected, analysis, and outcomes of the project, demonstrating a clear connection between academic knowledge and practical application.

Course Contents

Unit	Description	Duration [Hrs]
A	On Job Training (OJT) is an integral component of the MBA program that provides students with a unique opportunity to bridge the gap between theoretical knowledge gained in the classroom and practical application in a real-world environment. This training aims to equip students with both technical and non-technical skills that are essential for success in the industry. Each student shall undertake an On-the-Job Training (OJT) at the end of Second Semester and complete the same before the commencement of the Third Semester. Guidelines for the On Job Training (OJT) Nature of the OJT: The On-the-Job Training (OJT) program shall be of 12 weeks (3 months). 1. 8 weeks of training in the organization (industry / bank etc.) with 30 hours of work per week. 2. 4 Weeks of pre and post training work including proposal making, analysis, report preparation and etc. 3. OJT must be conducted outside the academic institution to expose students to real-world work environments. 4. **OJT must be related to the intended specialization of the student.** 5. OJT must be done individually. Group projects are not permitted. 6. OJT may involve actual tasks relevant to the area of specialization of the student and as per the demands of the industry / organization where the student is carrying out the OJT. 7. OJT should involve fieldwork / desk work in the organisation; **online OJT is not permitted**.	(14+2)

	8. Primary data collection is mandatory for Research based OJT. 9. Research based OJT can be quantitative / qualitative in nature or even use mixed approaches. 10. Research based OJT can involve surveys, interviews, case studies or observation studies. 11. It is mandatory for the student to seek advance written approval from the faculty mentor and the Director of the Institute about the type of work and organization before commencing the OJT.	
B1	Permissible Partner Organizations: Students have the flexibility to conduct the OJT with any of the following organizations: 1. Companies listed on either NSE or BSE in India /abroad 2. Unlisted subsidiaries of Listed Companies. 3. Government / Semi-Government Undertaking / PSU 4. Government Offices 5. Start Ups with an existence of 3 years or more and/or manpower more than 10. 6. Family managed businesses with an existence of 10 years or more and manpower more than 100. 7. Large Cooperative Societies / NGOs with an existence of 5 years or more operating in areas such as agriculture, food processing, health care, retail, banking, etc.	
B2	OJT mentors: a) Each student shall be assigned two mentors i. a faculty mentor from the institution ii. an industry mentor from the host organization where the student undertakes the OJT. b) **Industry Mentor Role:** The industry mentor plays a crucial role in guiding the student during the internship. They ensure that the internee fulfils the requirements of the organization and successfully meets the demands of the assigned project. Through their expertise and experience, industry mentors provide valuable insights into real-world practices and industry expectations. c) **Faculty Mentor Role:** The faculty mentor serves as the overall coordinator of the OJT program of the assigned / allotted students. They oversee the entire internship process and evaluate the quality of the OJT in a consistent manner across all the assigned students. The faculty mentor ensures that the OJT aligns with the MBA program's objectives and provides valuable learning opportunities. They also facilitate communication between the institution, industry mentor, and student to ensure a fruitful OJT experience.	
B3	**Submission of documentation for OJT:** a) **OJT Progress diary**: Each student shall maintain an OJT Progress Diary detailing the work carried out and the progress achieved on a daily basis. Daily entry can be of 3- 4 sentences giving a very brief account of the learning/activities/ tasks / interaction taken place. The faculty mentor will be monitoring the entries in the diary regularly. The student shall submit the duly signed and stamped OJT Progress Diary along with the OJT Report. Soft copy diaries (with time stamp) are also permitted. b) **Formal Evaluation from the industry mentor**: The students shall also seek a formal evaluation cum feedback of their OJT from the industry mentor. The formal evaluation cum feedback by the industry mentor shall comment on the nature and quantum of work undertaken by the student,	

	the effectiveness and overall professionalism. The learning outcomes of the OJT and utility of the OJT to the host organization must be specifically highlighted in the formal evaluation cum feedback by the industry mentor. The OJT evaluation sheet duly signed and stamped by the industry mentor shall be included in the final OJT report. c) **OJT report**: A student is expected to make a report based on the OJT he or she has done in an organization. The student shall submit TWO hard copies & soft copy of the OJT report to the institute. One hard copy of the OJT report is to be returned to the student by the Institute after the External Viva-Voce. In the interest of environmental considerations, students are encouraged to print their OJT reports on both faces of the paper. Spiral bound copies may be accepted.	
B4	**OJT report should contain the following:** The OJT report should be well documented and supported by – 1. Institute's Certificate 2. Certificate by the Company 3. Formal feedback from the company guide 4. Executive Summary 5. Organization profile 6. Outline of the problem/task undertaken 7. Research methodology & data analysis (in case of research projects only) 8. Relevant activity charts, tables, graphs, diagrams, pictures, screenshots, AV material, etc. 9. Learning of the student through the OJT 10. Consideration to factors such as environment, safety, ethics, cost, professional (national & international) standards 11. Contribution to the host organization References in appropriate referencing styles. (APA, MLA, Harvard, Chicago Style etc.)	
B5	**Interaction between mentors:** It is suggested that a meet-up involving the intern, industry mentor, and the faculty mentor should be done as a mid- term review to ensure the smooth conduct of the OJT. The meeting can preferably be online to save time and resources. The meeting ensures the synergy between all stakeholders of the OJT. A typical meeting can be of around 15 minutes where at the initial stage the intern briefs about the work and interaction goes for about 10 minutes. This can be followed by the interaction of the mentors in the absence of the intern. This ensures that issues between the intern and the organization, if any, are resolved amicably	
B6	**OJT workload for the faculty:** Every student is provided with a faculty member as a mentor. So, a faculty mentor will have a few students under him/her. A faculty mentor is the overall in-charge of the OJT of the allocated students. He/she constantly monitors the progress of the OJT by regularly overseeing the diary, interacting with the industry mentor, and guiding on the report writing etc.	
B7	**Evaluation Pattern:** **Total Marks: 200** **Formative Assessment: 100 Marks Summative Assessment: 100 Marks**	
	Total	**16**

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Structured Query Language			Course Code	MB25SEAI-305			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 305.1	UNDERSTANDING	**Understand** the fundamentals of Database Management Systems, database models, ER/EER diagrams, normalization concepts, and time series basics such as stationarity, decomposition, and basic models..
CO 305.2	APPLYING	SQL commands (DDL, DML, DCL, TCL), joins, nested queries, functions, indexes, and PL/SQL components such as procedures, triggers, cursors, and CTEs to manage and manipulate databases..
CO 305.3	APPLYING	Apply NoSQL concepts, perform CRUD operations, indexing and aggregation in MongoDB, and implement basic time-series forecasting methods such as moving averages, linear trend, SMA, and EMA.
CO 305.4	ANALYSING	Analyse relational database designs using functional dependencies, normalization (1NF, 2NF, 3NF, BCNF), relational integrity constraints, ER-to-table conversion, ACF/PACF interpretation, and model identification for AR, MA, ARMA, and ARIMA.
CO 305.5	EVALUATING	**Evaluate** database transaction behaviour, ACID properties, concurrency issues, serializability, schedule types, forecasting model performance, and compare SQL vs NoSQL database systems.

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction to Database Management System** Introduction to Database Management Systems, Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Enterprise Constraints Data Models, Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E-R Features, Converting E-R & EER diagram into tables	(7+2)
II	**SQL**: DDL, DML, Select Queries, String, Date and Numerical Functions, Aggregate Functions ,View, Indexes, Group by and Having Clause, Join Queries, Set, Set operation, Set membership, Nested queries, DCL, TCL PL/SQL: Control Statement, Cursor, Stored Procedure and Function, Trigger, CTE	(7+2)
III	**Relational Model:** Basic concepts, Attributes and Domains, CODD's Rules, Relational Integrity, Referential Integrities, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, 2NF, 3NF, BCNF. Case study: Design and Optimization of a Relational Database for a University Management System	(7+2)
IV	**Basic concept of a Transaction:** Database Transaction Management, Properties of Transactions, ACID, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods. Introduction to NoSQL Database, NoSQL data models, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL, MongoDB: CRUD Operations, Indexing and Aggregation, Basic Optimization.	(7+2)
V	Using SQL tor Risk Analysis & Fraud Detection (Case Study: Credit Card Fraud Detection), SQL in Financial Reporting & Compliance, SQL & Data Warehousing in Fintech, Integration of SQLwith Bl Tools (Power BI, Tableau) Hands-on: Creating an SQL-based financial dashboard using Tableau/Power Bl	(7+2)
	Total	45

Suggested Text Books

1. Learning SQL" by Alan Beaulieu: O'Reilly Media, 3rd Edition, 2020.
2. SQL in 10 Minutes, Sams Teach Yourself' by Ben *donna.* Sams Publishing, 5th Edition, 21)19.
3. Head First SQL" by Lynn Beighley: O'Reilly Media, 1st Edition, 2007.
4. SQL tor Data Analytics" by Upom Malik, Matt Goldwasser, and Benjamin Johnston: Packt Publishing, 2nd Edition, 2022.
5. Database System Concepts" by Abraham Silbersehatz, Henry F. Korth, and S. Sudarshan (Indian Author): McGraw-Hill Education, 7th Edition, 2020.

Suggested Reference Books:

1. SQL: The Complete Reference" by James R. Groft'and Paul N. Weinberg: McGraw-Hill Education, 3rd Edition, 2003.
2. "Fundamentals of Database Systems" by Rainez Elinasri and Shamkant B. Navathe: Pearson Education, 7th Edition, 2016.
3. "Mastering PostgreSQL in Application Develoғment" by Dimitri Fontaine: 1st Edition, 2020.
4. "MySQL Cookbook" by Paul DuBois: O'Reilly Media, 4th Edition, 2020.
5. "Database Management Systems" by Raghu Rainakrishnan and Johannes Gehrke (Indian Adaptation available): McGraw-Hill Education, 3rd Edition.

Suggested Online Link

1. https://onlinecourses.nptel.ac.in/noc26_cs72/preview
2. https://onlinecourses.nptel.ac.in/noc22_cs91/preview
3. https://onlinecourses.swayam2.ac.in/ntr25_ed136/preview
4. https://www.coursera.org/learn/sql-practical-introduction-for-querying-databases

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Introduction to Machine Learning			Course Code	MB25SEAI-306			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 306.1	REMEMBERING	Apply ML roadmap for Data exploration
CO 306.2	UNDERSTANDING	Analyze Model performance for Data models
CO 306.3	APPLYING	Apply ML libraries for model validation
CO 306.4	ANALYSING	Evaluate CART for creating models
CO 306.5	EVALUATING	Create and check the Recommendation systems

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction & Fundamentals of Algorithms:** Need for algorithms in ML: Why ML vs traditional programming Learning paradigms: Supervised, Unsupervised, Semi-supervised, Reinforcement, Parametric vs non-parametric models ,Goals of ML: prediction, pattern recognition, clustering, recommendation Performance measures: Accuracy, Precision, Recall, F1-Score, ROC, Validation Fundamentals of algorithms: data types, features, dimensionality, distance measures.	(7+2)
II	**Supervised Learning Algorithms:** K-Nearest Neighbours (KNN) Algorithms: principle, distance measures, selecting K Parametric models: e.g., Naïve Bayes (Gaussian, Multinomial), full Bayes Tree-based algorithms: e.g., CART (Classification and Regression Trees), CHAID, advantages of trees, ensembles (bagging, boosting) Prediction accuracy, overfitting vs underfitting, bias-variance tradeoff, validation techniques	(7+2)
III	**Unsupervised Learning & Clustering Unsupervised algorithms:** clustering approaches (K-means, hierarchical clustering, dendrograms) Distance and similarity measures (Euclidean, Manhattan, Cosine)Feature extraction, dimensionality reduction (PCA, LDA) Application contexts: segmentation, anomaly detection **Association & Recommendation Algorithms Association (Market Basket Analysis):** Apriori algorithm, rule selection, support, confidence, lift Recommender systems: collaborative filtering (user-item, item-item), matrix factorization, hybrid methods Use-cases in marketing, e-commerce (Addresses your mention of "Association Algorithms", "Market basket analysis", "Recommender systems"),	(7+2)
IV	**Advanced Topics, Ensembles & Practical Considerations:** Ensemble methods: Random Forest, Gradient Boosting, Bagging, Voting Model selection, feature engineering, preprocessing (handling missing data, normalisation, standardization) , **ML Ops Basics:** End-to-end ML lifecycle (data → model → deployment → monitoring),CI/CD for machine learning, Model and data versioning (MLflow, DVC),Containerization with Docker, Model monitoring (data drift, concept drift) Parametric vs non-parametric again; supervised vs unsupervised recap Ethical considerations, interpretability, real-world deployment, big-data issues Case studies: Applying ML in a practical scenario,	(7+2)

V	**Feature Engineering:** Data preprocessing (missing values, scaling, encoding),Feature construction (polynomial features, date/time features, text features),Feature selection (Correlation, Chi-square, RFE, Lasso, tree-based methods),Dimensionality reduction (PCA), **Hyperparameter Tuning:** Grid search and Random search, Bayesian optimization (Optuna/Hyperopt basics),Cross-validation strategies, Avoiding overfitting during tuning, **Deployment via APIs:** Building REST APIs using Flask/FastAPI, Model serialization (Pickle/Joblib),Docker-based deployment, Testing APIs with Postman, Cloud deployment basics (AWS/GCP/Azure)	(7+2)
	Total	**45**

Suggested Textbooks:

1. Fundamentals of Machine Learning for Predictive Data Analytics, John D. Kelleher, Brian Mac Namee, Aoife D'Arcy, The MIT Press, 2020
2. Pattern Recognition and Machine Learning, Christopher M Bishop, Springer, 2020
3. Data Mining for Business Analytics, Galit Shmueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, Kenneth C. Lichtendahl, Jr.,Wiley, 2nd Ed., 2019
4. Introduction to Machine Learning with Python, Andreas Muller, O'Reilly, 2018

Suggested Reference books:

1. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, MIT Press, 1st Edition, 2012.
2. **The Elements of Statistical Learning: Data Mining, Inference, and Prediction**, Trevor Hastie, Robert Tibshirani & Jerome Friedman, Springer, 2nd Edition, 2009
3. **Machine Learning – An Algorithmic Perspective**, Stephen Marsland, CRC Press (Chapman & Hall/CRC), 2nd Edition, 2014.

Suggested Online Link

1. https://onlinecourses.nptel.ac.in/noc22_cs97/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs74/preview
3. https://www.coursera.org/learn/machine-learning-1
4. https://www.coursera.org/browse/data-science/machine-learning

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Artificial Intelligence and its Applications			Course Code	MB25SEAI-307			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 307.1	REMEMBERING	Remember the overview on Artificial Intelligence
CO 307.2	UNDERSTANDING	Understand the approaches and rules to knowledge representation
CO 307.3	APPLYING	Analyze the Constraints of Satisfaction Problems
CO 307.4	ANALYSING	Analyze the Search strategies and types of searches
CO 307.5	EVALUATING	Evaluate the components of the planning system and expert Systems

Course Contents

Unit	Description	Duration [Hrs]
I	Introduction To AI, Overview of AI, Problems of AI, AI technique, Tic-Tac-Toe problem, Intelligent Agents, Agents, Environment, Nature of Environment, Structure of Agents, Goal Based Agents, Utility Based Agents, Learning Agents, Problem Solving, Problems, Problem Space & search, Defining the problem as state space search, Production System, Characteristics.	(7+2)
II	Introduction to Search Techniques, Problem solving agents, Searching for solutions, Uniform search strategies, Breadth first search, Depth first search, Depth limited search, Bidirectional search, Comparing uniform search strategies, Heuristic search strategies, Greedy best-first search, A* search, AO* search, Memory bounded heuristic search, Local search algorithms, Optimization problems, Hill climbing search, Simulated annealing search, Local beam search,Issues in the design of search programs.	(7+2)
III	Introduction to Constraint Satisfaction Problems, Local search for constraint satisfaction problems, Adversarial search, Optimal decisions, Strategies in games, The minimax search procedure, Alpha-beta pruning, Additional refinements, Iterative deepening	(7+2)
IV	Introduction to Knowledge & Reasoning, Knowledge representation issues, Representation & mapping, Approaches to knowledge representation, Using predicate logic, Representing simple fact in logic, representing instant ISA relationship, Computable functions & predicates, Resolution, Natural deduction, Representing knowledge using rules, Procedural verses declarative knowledge, Logic programming, Forward verses backward reasoning, Matching, Control knowledge	(7+2)

V	Introduction to Probabilistic Reasoning, Representing knowledge in an uncertain domain, The semantics of Bayesian networks, Planning Overview, Components of a planning system, Goal stack planning, Hierarchical planning, Other planning techniques, Expert Systems, Representing and using domain knowledge, Expert system shells, Knowledge acquisition, Control knowledge, Generative AI applications, AI use cases in major industries, chatbots & agents.	(7+2)
	Total	**45**

Suggested Textbooks:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson, 3rd Edition, 2020
2. Ethem Mining, Artificial Intelligence for Business Applications: Use Artificial Intelligence for Scaling Up Your Business Using AI Marketing, Everooks Ltd, 2020
3. Ela Kumar ,Artificial Intelligence, , Dreamtech Press, 2020
4. Ritch & Knight, Artificial Intelligence, Tata McGrawHill, 3rd Edition, 2019
5. Patterson, Introduction to Artificial Intelligence & Expert Systems, PHI, 2015

Suggested Reference books:

1. Artificial Intelligence: Foundations of Computational Agents, David L. Poole & Alan K. Mackworth, Cambridge University Press, 1st Edition, 2010
2. Introductions to Expert Systems, Peter Jackson, Pearson Education, 3rd Edition, 2007.
3. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, George F. Luger, Pearson Education, 4th Edition, 2002

Suggested Online Link

1. https://onlinecourses.nptel.ac.in/noc22_cs56/preview
2. https://onlinecourses.nptel.ac.in/noc25_cs159/preview
3. https://www.coursera.org/learn/ai-for-everyone
4. https://www.coursera.org/courses?query=artificial%20intelligence

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Data Visualization			Course Code	MB25SEAI-308			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 308.1	REMEMBERING	Recall the basic concepts, importance, and types of data visualization tools and their real-world applications in business analytics.
CO 308.2	UNDERSTANDING	Explain the structure, features, and menus in Tableau for creating visual representations of data.
CO 308.3	APPLYING	Apply various Tableau functions to analyze time series data and add filters for dynamic visualization.
CO 308.4	ANALYSING	Analyze datasets using Tableau's features to uncover patterns, relationships, and business insights.
CO 308.5	EVALUATING	Evaluate the performance and effectiveness of Tableau dashboards and visual analytics in decision-making.

Course Contents

Unit	Description	Duration [Hrs]
I	Data visualization tools, Data storytelling, Visual analytics and 7 step process, Tableau basics, navigating tableau, Design principles, Time Series, Aggregation and Filters, Maps and scatterplots, creating first dashboard, Joining and blending data, Advance dashboards, Advance data preparation, Clusters, Custom territories and design filters	(7+2)
II	Navigating tableau, connecting tableau to a data file, Creating calculated fields, Adding colours, labels and formatting, Exporting worksheet, Design principles, Design principles for Marketing domain, Design principles for Finance domain, Design principles for HR domain, Selecting the appropriate charts based on the data	(7+2)
III	Data extracts, String, Date & Logical calculations, Parameters in Tableau, Working with Time Series, Working with time series for functional domain, Creating area chart and Highlighting, Adding filters, What-If-Analysis with parameters, Special charts, Charts for a specific application	(7+2)
IV	Joining data in Visualization, Working with Hierarchies, Creating a scatter plot, Creating dashboard, Data Storytelling, Adding an interactive action, Highlighting, Dashboards actions, Joins - Joining vs Blending data, Data blending, Dual-axis chart	(7+2)
V	Mapping - setting geographical roles, Creating Tableau calculations for gender, Creating bins and distributions for age, Leveraging power of Parameters, Creating a Tree map chart, Creating a Tree map for a specific application, Dashboard Interactivity, Advanced dashboard interactivity, Clustering in Tableau, KPI visualization standards.	(7+2)
	Total	45

Suggested Textbooks:

1. Better Data Visualizations – A Guide for Scholars, Researchers, and Wonks, Jonathan Schwabish, Columbia University Press, 2021.
2. The Power of Data Storytelling, Sejal Vora, 1st Edition, Sage Publication India Pvt. Ltd., 2019
3. Getting Started with Tableau, Tristan Guillevin, 2nd Edition, Packt Publishing, 2019
4. The Big Book of Dashboards, Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave, Wiley, 2017.

Suggested Reference books:

1. Show Me the Numbers: Designing Tables and Graphs to Enlighten, Stephen Few, Analytics Press, 2nd Edition, 2012.
2. The Truthful Art: Data, Charts, and Maps for Communication, Alberto Cairo, FT Press, 1st Edition, 2016.
3. Data Visualization: A Practical Introduction, Kieran Healy, Princeton University Press, 1st Edition, 2019.

Suggested Online Links:

1. https://www.classcentral.com/course/swayam-introduction-to-data-visualization-452115
2. https://www.coursera.org/learn/dataviz-dashboards
3. https://www.coursera.org/specializations/data-visualization

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Big Data Analytics and Cloud Computing			Course Code	MB25SEAI-309			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	FA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 309.1	REMEMBERING	To understand the fundamentals and architecture of Big Data and Cloud Computing.
CO 309.2	UNDERSTANDING	To explore tools, frameworks, and databases used for large-scale data storage and processing.
CO 309.3	APPLYING	To design and implement cloud-based analytics solutions in financial contexts
CO 309.4	ANALYSING	To apply real-time processing tools for fintech applications such as fraud detection.
CO 309.5	EVALUATING	To integrate AI, block chain, and big data for secure, ethical, and picture-ready financial services

Course Contents

Unit	Description	Duration [Hrs]
I	Fundamentals of Big Data: Characteristics (Volume, Velocity, Variety, Veracity, Value), Traditional vs. Big Data Analytics, Introduction to Cloud Computing and its significance, Key characteristics: on-demand access, scalability, elasticity, Pay-as-you-go and consumption-based pricing models, Virtualization as the foundation of cloud infrastructure ,Overview of global cloud infrastructure (Regions, Zones, Data Centers) Cloud Computing Models: Iaas, PaaS, SaaS (AWS. Azure, Google Cloud) Distributed Computing & Storage: Hadoop Ecosystem Overview	(7+2)
II	NoSQL Databases: MongoDB, Cassandra, HBase, Data Warehousing vs. Data Lakes, ETL (Extract, Transform, Load) & Data Pipeline Design, Introduction to Apache Spark and its role in large-scale machine learning, Basic machine learning concepts within Spark: transformers, estimators, and pipelines, Data preprocessing techniques: feature extraction, feature transformation, and feature selection, Hadoop Ecosystem Basics	(7+2)
III	Introduction to commonly used algorithms in Spark ML (classification, regression, clustering), Model training, testing, and evaluation using Spark ML libraries, Handling big data for ML tasks using distributed processing, Overview of Spark MLlib and the Spark ML pipeline architecture, Apache Spark & PySpark for Big Data Processing, Hands-on: Performing ETL Operations on Large Datasets	(7+2)
IV	Cloud Storage Solutions (AWS S3, Google Cloud Storage. Azure Blob) Cloud-Based Machine Learning & AI Services (AWS SageMaker, Google Vertex AI) Security & Compliance in Cloud Computing Serverless Computing & Containerization (Docker, Kubernetes)	(7+2)
V	Real-Time Data Processing with Apache Katka & Flink, Use of Stream Processing in Fraud Detection & High-Frequency Trading, Event-Driven Architecture & Microservices in Banking, Implementing Real-Time Transaction Monitoring in Fintech Cloud-Based Risk Management & Credit Scoring, Al & Big Data Integration for Algorithmic Trading, Blockchain & Big Data: Secure Data Transactions, Ethical Considerations & Future of Big Data in Financial Services , Hands-on: Building a Big Data Dashboard for Business Insights.	(7+2)
	Total	45

Suggested Textbooks:

1. Machine Learning, Blockchain Technologies, and Big Data Analytics for IoTs, edited by Amit Kumar Tyagi and Ajith Abraham, published by Wiley in 2024.
2. Industry 4.0 Convergence with AI, IoT, Big Durie, and Cloud Computing. Fundamentals, Challenges, and Application, **Editors:** Parikshit N. Mahalle, Gitanjali R. Sliinde, Prachi M. Joshi; **Publisher:** Bentham Science Publishers; **Edition:** 2023
3. Intelligent Computing on IOT 2.0, Big Data Analytics, and Block Chain, **Editors:** Mohammad Obaidat, Padmalaya Nayak, Niranjan Ray; **Publisher:** CRC Press; **Edition:** 2024

Suggested Textbooks:

1. Blockchain, Big Data, and machine Learning. Trends and Applications, **Editors:** Neeraj Kumar, Gayathri Md Arafatur Rahman, Balamurugan Rainadass; **Publisher:** CRC Press; **Edition:** 2024
2. Big Data and Artificial Intelligence in Digital Finance. Increasing personalization and Trust in Digital Finance using Big Datai and AI,' **Publisher:** Springer; **Edition:** 2024

Suggested Online Link:

1. https://onlinecourses.nptel.ac.in/noc24_cs58/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs17/preview
3. https://www.coursera.org/specializations/big-data
4. https://www.coursera.org/learn/big-data-analytics

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Block Chain and Crypto Currency			Course Code	MB25SEAI-310			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	FA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 310.1	REMEMBERING	To introduce the foundational concepts of block chain technology and its architecture.
CO 310.2	UNDERSTANDING	To explain how cryptocurrencies, operate and their role in digital financial systems
CO 310.3	APPLYING	To explore consensus mechanisms, smart contracts, and decentralized applications.
CO 310.4	ANALYSING	To examine the real-world use cases of block chain across industries.
CO 310.5	EVALUATING	To evaluate regulatory, ethical, and security aspects of' block chain and cryptocurrencies

Course Contents

Unit	Description	Duration [Hrs]
I	Evolution of Blockchain: From Bitcoin to Web3, Blockchain vs. Traditional Databases: Key Differences, Types of Blockchains: Public, Private, Hybrid & Consortium, How Blockchain Works: Blocks, Nodes, Miners, and Consensus, Case Study: How Bitcoin Revolutionized Digital Transaction	(7+2)
II	Bitcoin and Altcoins: Understanding Different Cryptocurrencies, How Cryptocurrency Transactions Work (Wallets, Keys, Signatures), Stablecoins, CBDCs, and Tokenization of Assets, Role of Cryptocurrencies in Global Finance, Case Study: El Salvador's Bitcoin Adoption as Legal Tender	(7+2)
III	Introduction to Smart Contracts and Solidity Programming, Ethereum and Smart Contracts: How They Work, Smart Contract Architecture: terms, functions, state variables, and events. Automation Mechanisms: triggers, conditions, and autonomous execution. Building DApps: Real-World Use Cases, DeFi (Decentralized Finance): Yield Farming, Lending, and Staking, Hands-on: Writing and Deploying a Smart Contract	(7+2)
IV	Cryptography in Blockchain: Hashing, Digital Signatures, and Encryption, Blockchain Vulnerabilities: 51% Attacks, Sybil Attacks, and Smart Contract Bugs, Regulatory Frameworks: FATF, MiCA, SEC, and India's Crypto Regulations, Ethical and Legal Considerations in Blockchain and Crypto, Case Study: The FTX Collapse and Its Impact on Crypto Regulation	(7+2)
V	Blockchain for Enterprises: Supply Chain, Healthcare, and Banking, NFTs (Non-Fungible Tokens): Digital Art, Gaming, and Ownership, Metaverse and Blockchain: The Future of Digital Economies, Emerging Trends: Zero-Knowledge Proofs, Layer 2 Scaling, and DAOs, AI plus Blockchain Use cases, Capstone Project: Building a Blockchain-Based Application, Introduction to fraud analytics, Types of Fraud, Fraud Data Sources, Fraud Detection Techniques.	(7+2)
	Total	45

Suggested Textbooks:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps — Daniel Drescher
2. Mastering Bitcoin: Unlocking Digital Cryptocurrencies — Andreas M. Antonopoulos
3. Mastering Ethereum: Building Smart Contracts and DApps — Andreas M. Antonopoulos & Gavin Wood
4. Blockchain Technology and Applications — Kumar Saurabh & Ashutosh Saxena
5. Blockchain Revolution — Don Tapscott & Alex Tapscott

Suggested Reference Books:

1. The Age of Cryptocurrency: How Bitcoin and Digital Money Are Challenging the Global Economic Order — Paul Vigna & Michael J. Casey
2. DeFi and the Future of Finance — Campbell R. Harvey, Ashwin Ramachandran, and Joey Santoro
3. Token Economy — Shermin Voshmgir

Suggested Online Link:

1. https://onlinecourses.nptel.ac.in/noc20_cs01/preview
2. https://onlinecourses.nptel.ac.in/noc26_cs34/preview
3. https://www.coursera.org/learn/introduction-blockchain-technologies
4. https://www.coursera.org/learn/blockchain

Course Syllabus
Second Year MBA.
(Artificial Intelligence)
Semester IV

Program	MBA (Artificial Intelligence)			Semester: IV				
Course	Entrepreneurship, Innovation and Design Thinking			Course Code	MB25GC-401			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 401.1	REMEMBERING	DESCRIBE the fundamentals of entrepreneurship, innovation and design thinking.
CO 401.2	UNDERSTANDING	UNDERSTAND the prerequisites of entrepreneurship and innovation.
CO 401.3	APPLYING	APPLY the Design Thinking process to real-world challenges.
CO 401.4	ANALYSING	IDENTIFY business opportunities and create viable business models.
CO 401.5	EVALUATING	EVALUATE entrepreneurial ideas and innovation strategies using design thinking principles and business model frameworks to determine their feasibility, viability, and desirability in real-world contexts.
CO 401.6	CREATING	Develop entrepreneurial mindsets and skills and Pitch ideas effectively to stakeholders or investors.

Course Contents

Unit	Description	Duration [Hrs]
I	**Entrepreneurship & Innovation** – Definition, Objective and Features: Entrepreneurship; Difference between Entrepreneurship and Traditional Businesses; Entrepreneurs and Intrapreneurs; Corporate Entrepreneurship, Technological Entrepreneurship, Life Cycle of Startup, Focus on Valley of Death, Why Startups Fail? Innovation: Culture of innovation - process and Types of innovation – Continuous and Disruptive, Radical Innovation, Challenges in innovation, Agile/Lean Innovation, Steps of Innovation Management, Idea Management System, Divergent V/s Convergent Thinking, Design Thinking and Entrepreneurship Creating Value through Innovation. Management of Innovation, Types of IPR	(7+2)
II	**Entrepreneurial Theories and Entrepreneurial Environment, Entrepreneurial Development-** Theories of Entrepreneurship; Successful Entrepreneurs and Their Traits; Types of Entrepreneurs; Entrepreneurial Environment- PESTEL and Their Effects; Business Environment Analysis, Business Planning; Mid-career Dilemmas; Entrepreneurial Growth and Competitive Advantage; Changing Role of Entrepreneurs. Women Entrepreneurs, Entrepreneurship Development Institute; Entrepreneurship Development Programs	(7+2)
III	**Design Thinking** – Introduction, Definitions and Meaning; Design Thinking –as an Art and Science; Stages of Design Thinking –Empathise, Define, Ideate, Prototype and Test; Entrepreneurship Design Thinking, Need of Design and Design Thinking Writing the Problem Statement; Understanding Stakeholders and Users; Personas, Empathy Maps; Current Scenarios to identify pain points; Ideation and Storyboarding; Deriving Goals from Ideas; Future Scenarios and Moments of Max Impact; Prototyping	(7+2)

IV	**Design Thinking in Start-Up** – 5 stages integration Empathise–Listening to People involved and the End User Problems Realisation, Understanding User Needs: User Research Techniques, Observation, Interviewing, Surveys, Persona Mapping; Define– Identifying User Problems, Problem Statement Formulation, Reframing Problems; Ideate – Generating Ideas, Brainstorming Techniques, Mind Mapping, Scenarios - Finding the solutions most effectively; Prototype – Making the samples to Launch, Different Types of Prototypes, Testing and Iterating; Test – Evaluating offerings, Usability Testing, User Feedback. Design thinking with AI	(7+2)
V	**Opportunity Recognition & Business Models-** Model of opportunity recognition (Corbett, 2005), Identifying opportunities through Design Thinking, Market research basics, Value Proposition Canvas, Business Model Canvas (BMC), Minimum Viable Product (MVP): Lean Startup & Validation- Lean Startup methodology (Eric Ries), Build- Measure-Learn cycle, Customer validation, Metrics and KPIs, Agile iteration. Teamwork and Collaboration. Business Model Failure: Reasons and Remedies. Sustainability Innovation and Entrepreneurship. Emerging technologies such as artificial intelligence, augmented reality, virtual reality	(7+2)
	TOTAL	45

Suggested Books:

1.Steps to Innovation: Going from Jugaad to Excellence – Rishikesha T. Krishnan and Vinay Dabholkar

2.Innovation and Entrepreneurship - Peter Drucker

3.Entrepreneurship: Business and Management – Dr. R.C. Bhatia, Sultan Chand & Sons, 2020

4. Entrepreneurship - Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha. 11th Edition

Suggested Reference Books:

1. Ten Types of Innovation – Larry Keeley, Helen Walters, Ryan Pikkel & Brian Quinn
2. Design Thinking for Strategic Innovation – Idris Mootee
3. Start with Why – Simon Sinek
4. Business Model Generation – Alexander Osterwalder & Yves Pigneur
5. The Startup Owner's Manual – Steve Blank & Bob Dorf
6. Design a Better Business – Patrick Van Der Pijl, Justin Lokitz & Lisa Kay Solomon

Suggested Online Link

1. https://onlinecourses.nptel.ac.in/noc21_mg63/preview
2. https://onlinecourses.nptel.ac.in/noc25_mg81/preview
3. https://www.coursera.org/learn/design-thinking-entrepreneurship

https://www.coursera.org/specializations/innovation-entrepreneurship

Program	MBA (Artificial Intelligence)			Semester: IV				
Course	Project Management			Course Code	MB25GC-402			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
2	1	1	1	10	10	30	-	50

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 402.1	REMEMBERING	DESCRIBE the basic terms and concepts in Project Management.
CO 402.2	UNDERSTANDING	EXPLAIN the various parameters of cost, time and quality in project management
CO 402.3	APPLYING	INTEGRATE the aspects of various functional areas of management to develop a Project perspective.
CO 402.4	ANALYSING	EXPLAIN techniques as cpm/pert/earned value analysis and projected financial statements
CO 402.5	CREATING	DEVELOP the capability of student to conceive an idea, evaluate it's feasibility and make it workable.

Course Contents

Unit	Description	Duration [Hrs]
I	**Overview of Project Management:** Concepts and attributes of Project, Project lifecycle and stake holders, Project Organization, WBS, Scope and priorities, Project Identification, Market feasibility with Moving Average and Exponential smoothing methods, Techno economic feasibility, Government policy to location, legal aspects, Preparation of DPR	(4+2)
II	**Project Planning**: Time and cost estimates with AON and AOA conventions, Budget estimates, Network analysis, Float analysis, crashing concepts	(4+2)
III	**Project scheduling and Risk Management:** Gantt chart, splitting and multitasking, Risks in time estimates PERT analysis**Project Organization:** Role and responsibilities of Project Manager, Team development model, sources of conflicts, conflict resolution	(4+2)
IV	**Earned value analysis:** 'S' curve, Cost and schedule performance indices using network, Revised estimates of cost and time **Financial analysis:** Profitability analysis, Using NPV, IRR, Payback and discounted Payback period, PI. Preparation of projected statements of Income- expenditure and balance-sheet	(4+2)
V	Computer applications and Software for Project Management, Project Management Cases	(4+2)
	TOTAL	**30**

Suggested Textbooks:

5. Project Planning estimation and assessment by Prasanna Chandra
6. Project Management : The Managerial Process by Gray and Larson 3E Tata McGraw- Hill
7. Quantitative Techniques in Management by N D Vohra

Suggested Reference Books:

1. Project Management Managerial Emphasis by Meredith and Mantel
2. Project Management: A Managerial Approach, Authors: Jack R. Meredith, Samuel J. Mantel Jr. & Scott M. Shafer, Publisher: John Wiley & Sons, Edition: 9th Edition (2016)
3. A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Author: Project Management Institute (PMI), Publisher: Project Management Institute, Edition: 7th Edition (2021)
4. Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Author: Harold Kerzner, Publisher: John Wiley & Sons, Edition: 12th Edition (2022 / reprint)

Suggested online link

Suggested Online link

1. https://onlinecourses.nptel.ac.in/noc25_mg127/preview
2. https://elearn.nptel.ac.in/shop/nptel/project-management/
3. https://www.coursera.org/learn/predictive-project-methodologies
8. https://www.coursera.org/learn/project-planning-and-execution-management

Program	MBA (Artificial Intelligence)			Semester:IV				
Course	Advanced Machine Learning			Course Code	MB25SCAI-403			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 403.1	REMEMBERING	Recall the fundamental concepts, terminologies, and types of machine learning models and optimization techniques.
CO 403.2	UNDERSTANDING	Understand the ensemble methods and Evaluate the right model
CO 403.3	APPLYING	Apply regularization and gradient descent to improve model fitting
CO 403.4	ANALYSING	Analyze the performance of model
CO 403.5	EVALUATING	Examine and evaluate the effects of hyperparameter tuning on model performance and efficiency.

Course Contents

Unit	Description	Duration [Hrs]
I	Fundamentals of Ensemble methods, Using committees of multiple hypotheses, Bagging, Boosting, Decorate, Active learning with ensembles, Framework for choosing the right model, overview of Transformer architectures	(7+2)
II	Overfitting, Underfitting, Bias and Variance trade-off, Regularization concepts, L1 and L2 regularization, Ridge regression, Lasso regression, Elastic net regression, regularization in deep learning models	(7+2)
III	What is a hyperparameter, Need for hyperparameter tuning, Steps involved in hyperparameter tuning, Approaches to hyperparameter tuning, Grid search, Random search, Automated hyperparameter tuning, Bayesian optimization	(7+2)
IV	Fundamentals of Gradient Descent, Intuition and steps in Gradient Descent, Cost function, Evaluation of coefficients, Types of Gradient Descent: Batch Gradient Descent, Stochastic Gradient Descent, Best practices, ML Ops basics and CI/CD pipelines	(7+2)
V	Basics of Support Vector Machines (SVM), Maximal-Margin Classifier, Soft Margin Classifier - Kernels, Implementing SVM in Python, Tune parameters, Advantages and limitations of SVM, model deployment and deployment challenges	(7+2)
	Total	45

Suggested Textbooks:

1. Evolutionary Machine Learning Techniques: Algorithms and Applications, Seyedali Mirjalili, Hossam Faris, Ibrahim Aljarah, 1st Edition,Springer 2020.
2. Mastering Machine Learning Algorithms, Giuseppe Bonaccorso, 2nd Edition, PacktPublishing 2020
3. Pattern Recognition and Machine Learning, Christopher M Bishop, Springer 2011.

Suggested Reference Book

1. Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 1st Edition, MIT Press, 2012.
2. Machine Learning, Tom M. Mitchell, 1st Edition, McGraw-Hill, 1997.
3. Deep Learning, Ian Goodfellow, Yoshua Bengio & Aaron Courville, 1st Edition, MIT Press, 2016.

Suggested Online Link

1. https://www.coursera.org/learn/advanced-learning-algorithms
2. https://www.coursera.org/learn/advanced-machine-learning-techniques-1
3. https://www.upgrad.com/machine-learning-courses/
4. https://www.upgrad.com/machine-learning-courses/

Program	MBA (Artificial Intelligence)					Semester: IV		
Course	Research Project					Course Code	MB25RPAI-404	
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
6	0	2	10	-	100	-	50	150

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 404.1	REMEMBERING	Carry out a substantial research-based project
CO 404.2	UNDERSTANDING	Demonstrate capacity to improve student achievement, engagement and retention
CO 404.3	UNDERSTANDING	An understanding of the ethical issues associated with practitioner research
CO 404.4	APPLYING	Applying domain knowledge and foundational research skills to address a research problem.
CO 404.5	ANALYSING	Analyse data and synthesize research findings.
CO 404.6	CREATING	Report research findings in written and verbal forms and use research findings to advance education theory and practice.

Course Contents

Unit	Description	Duration [Hrs]
A]	**Preamble:** A research project is a systematic and organized endeavour undertaken to investigate a specific topic, question, or problem in order to gain new insights, knowledge, or understanding. The objective of the research project is to further develop the student's ability to carry out and contribute to business research. The student should demonstrate, through his/her thesis and orally, an ability to plan, conduct, and present a scientific investigation of relevance to the subject of Business Administration and the student's chosen Master's program. A further aim is to develop skills for the critical examination of investigations and research reports and to provide the student with the opportunity for a deeper level of theoretical study within a chosen area. These projects involve a structured process of inquiry, data collection, analysis, and interpretation to arrive at meaningful conclusions. **Learning Objectives** 1. Understand the purpose and significance of research in business management. 2. Develop skills in research methodology, data analysis, and interpretation. 3. Learn to conduct a thorough literature review and critically evaluate existing research. 4. Learn to formulate a clear research question and develop a compelling research proposal. 5. Master the art of writing a well-structured and coherent dissertation. 6. Gain confidence in presenting research findings to an academic audience.	(10+2)

B - 1]	**Conducting research projects can offer benefit and advantages to the students:** 1. **Intellectual Growth:** Engaging in research projects allows students to explore and develop their intellectual curiosity. It encourages critical thinking, problem-solving skills, and the ability to analyse complex issues. 2. **Skill Development:** Research projects help students develop a variety of skills such as information gathering, data analysis, literature review, writing, presentation, and time management. These skills are valuable both academically and in future careers. . 3. **Deepened Understanding:** Research enables students to delve deeply into a specific topic, gaining a more comprehensive understanding of it beyond what's covered in regular coursework. 4. **Independent Learning:** Research projects encourage self-directed learning. Students learn how to set their own goals, manage their time, and work independently, fostering a sense of responsibility and initiative. 5. **Problem Solving:** Through research, students confront real-world problems and work towards finding innovative solutions. This experience prepares them to tackle challenges in various aspects of their lives. 6. **Personal Growth:** Research projects can boost students' confidence as they overcome obstacles, contribute to knowledge, and present their findings to peers and professors. This can positively impact their self-esteem and personal growth. 7. **Networking:** Engaging in research projects often involves collaboration with professors, peers, and sometimes professionals in the field. This can lead to valuable networking opportunities and connections that might be beneficial for future academic or career pursuits. 8. **Enhanced Resume/CV:** Having research experience on a resume can make students stand out to potential employers or graduate programs. It demonstrates their commitment to learning and their ability to handle complex tasks. 9. **Contribution to Knowledge:** Even in the early stages of their academic careers, students can contribute to the existing body of knowledge. Their research findings might lead to new insights or perspectives in their chosen field. 10. Preparation for undertaking Research: For students considering post graduate, engaging in research during their postgraduate years can provide a taste of the kind of work they might encounter at the next academic level PhD. 11. **Career Exploration**: Research projects can help students explore potential career paths within their field of study. They might discover specific areas they are particularly passionate about. 12. **Personal Interest Pursuit**: Research projects often allow students to delve into topics that deeply interest them, providing a fulfilling and enjoyable learning experience. 13. **Exposure to Research Methods:** Students gain exposure to various research methodologies, which can be beneficial not only in academia but also in fields where data analysis and evidence-based decision-making are crucial. 14. **Critical Evaluation:** Research requires students to evaluate existing literature, sources, and information critically. This skill helps them become	**(10+2)**

	more discerning consumers of information. **Long-Term Impact:** Some research projects can have lasting impacts beyond the academic realm, contributing to policy changes, technological advancements, or improvements in various industries	
B-2]	In Semester IV the student shall work under the supervision of the faculty and carry out a Research Project and submit a structured report in TWO hard bound copies (Blackbook) & one soft copy (PDF). In the interest of environmental considerations, students are encouraged to print their Research Project reports on both faces of the paper. The student is required to conduct advanced research on a topic related to one (or more) of contemporary issues in management. The topic is chosen in consultation with the student's supervisor. The student will prepare and present a detailed research proposal prior to starting the work. It is mandatory for the student to seek advanced written approval for Research Report Proposal from the faculty Supervisor and the Director of the Institute about the topic before commencing the Research Project work. A Research Project outlining the entire problem, including a survey of literature and the various results obtained along with their solutions, is expected to be produced. The student must submit the completed Research Project and make an oral presentation of the same. Through the Research Project, the student is expected to furnish evidence of competence in understanding varied aspects of the theme/topic selected and a deep understanding of the specialty area. The completion of the Research Project / project shall be certified by the Faculty Supervisor, HOD & approved by the Director of the Institute. 1) All sheets are to be A4 size. 2) The Text in all the chapters shall be in Times New Roman 12 Font, Regular, justified with line spacing of 1.15. 3) The margins shall be as follows: Top & Bottom: 0.8 inches; Left: 1 inch, Right: 0.5 inches 4) One extra line spacing should be left in between paragraphs. 5) All Chapter headings are to be centred in the Font Times New Roman 14 size Bold. 6) All headings of section shall be in Times New Roman 12 Bold 7) All sub-section headings shall be in Times New Roman , size, 12, Bold, Italic. 8) All minor sub-section headings shall be in Times New Roman , size, 12, Regular. 9) It is advised that the sections and sub- sections are to be limited to 3rd level a. Zero Level - Chapter Headings b. First Level - Main sections in each chapter : to be numbered as 1.1, 1.2, 2.1, 3.1 etc. c. Second level - Sub- sections in each section : to be numbered as 1.1.1, 1.2.2, 2.1.3, 3.2.1 etc. d. Third level - Minor sub-sections ie., sections in sub-sections. : to be numbered as 1.1.1.1, 1.2.2.1, 2.1.3.2, 3.2.1.4 etc. - to be avoided to the extent possible. 10) All the references / Bibliography are to be listed at the end, arranged in the chronological order and are to be numbered 1, 2, 3 etc. 11) The reference No. should be given as superscript in the report wherever they appear. 12) All the figures are to be numbered as Fig. 1.1, Fig. 2.3 etc indicating chapter No and the sl. No. of the figure in that chapter. The title of the figure should at the bottom of the figure and should be numbered as shown below. Fig. 1.1 Study Area Fig. 2.1 Definition Sketch Fig. 3.2 Experimental Setup etc…	

13) All the figures are to be placed at the end of each chapter. Alternatively, they can be placed after the page where they are first referred to. Uniformity should be maintained and under no circumstances should these two alternatives indicated be mixed.

Research projects may include:

- Developing a research question or statement
- Finding and evaluating sources
- Conducting research
- Writing a report etc

Students can do-

- Survey based research.
- Secondary data analysis such as decision analysis, cost effectiveness analysis or Meta-analysis.
- Observation based/Interview based research.

Each student must work under the supervision of a faculty mentor.
Depending on the area of research interest or the research topic,

B-3]

Research Project Process

I. SELECTION OF THE RESEARCH TOPIC:

The first major challenge in conducting research

1. The easiest way is working with a faculty mentor who is active in research and may have defined one or more researchable questions.
2. Consulting with leading faculty in your area of interest and asking for advice on researchable topics is another avenue for research ideas.
3. Developing research ideas from loose ends discovered during: a) desk research/FP/SIP/OJT, b) literature review c) reviewing journal article(s), and d) discussions, critique of research articles in journal club, could be an interesting, and a rewarding experience.

II. DEVELOPING THE RESEARCH PROPOSAL

A research proposal helps to develop research idea into a valid, scientific research project. A general outline of the elements of a Research Proposal is presented. Although the Research Project Outline provides a description of all the elements of a research project, students are required to complete the writing up of the Methodology section before beginning the project implementation. Writing of the research proposal has a twofold purpose:

1. it provides the researcher, with the blueprint for implementing the project, and
2. it has to be submitted to the research supervisor, HOD and Director of the Institute) for securing approval.

III. PROJECT IMPLMENTATION

In order to conduct a valid, scientific study, it is important that student rigorously follow the study design outlined in your research proposal and approved by the research supervisor. To ensure timely completion of the project, it is important to stay within the framework discussed in the Timeline.

IV. WRITE-UP OF PROJECT RESULTS AND DISCUSSION

This should follow directly from your research proposal. The research

	project outline provides a 'how to' write-up of the results and discussion sections. **V. RESEARCH PRESENTATION** Once the research project is complete, student have to make a public oral presentation to present the work.	
B-4]	**OUTLINE OF A RESEARCH PROJECT** **I. TITLE PAGE** (Page 1, DO NOT NUMBER) ➢ Study Title ➢ Names of the Supervisor (faculty mentor) ➢ Discipline ➢ Name of the Institute ➢ Date: month and year proposal prepared/submitted **II. *SUMMARY (Page2, 1-2 pages; DO NOT NUMBER)*** The summary should be brief and include: 1) a few sentences introducing the topic of current study (could include a couple of references); 2) statement of the problem; 3) a brief description of the methodology to be used including duration of study, subject selection criteria, tests to be performed, and/or data to be collected; 4) significance and implications of the study (why is it important to do the study, and what are the benefits: fill in gap in knowledge; develop further understanding of a clinical situation; modify current approach to treatment; cost-benefit analysis etc., etc.). **III. INTRODUCTION** (Page 3; up to 2 – 3 pages) This section consists of an overview of the research question and some indication of the study's worth and the contribution it is apt to make to the field of study. It should include the rationale for the research project. **IV. REVIEW OF THE LITERATURE** (Page 4; up to 4 –6 pages; a minimum of 10 references required). Use references to establish the link between the proposed study and previous work done on the topic, lay the groundwork for the proposed study, and demonstrate why it is important and timely. The literature review is not just a compilation of facts, but a coherent argument that leads to the description of the proposed study. **V. PROBLEM STATEMENT & RESEARCH HYPOTHESES** (up to 1/2-1 page) The problem statement describes the problem posed by the proposed study and specifies it in the form of Research Hypotheses. The research hypotheses should flow logically from the discussion presented in the Review of Literature and the Statement of the Problem. The hypotheses should be very specific in presenting what aspects of the research topic will be studied, and how. The hypotheses (If any) should be optimally clear, concise, meaningful, and typically written in the present tense. One recommended statement of the criteria for a good hypothesis is that is: a) be free of ambiguity, b) express the relationship between two variables or concepts, and c) imply an empirical test. AVOID having more than one	(

hypothesis embedded in a single, complex statement. A conceptual model represents a visual depiction of the relationship between all the variables in your study. It is a good place to start when planning your research project, and also helps in developing your hypotheses.

VI. RESEARCH METHODOLOGY (up to 2-3 pages)

1. Study Duration: Describe the time frame during for which data will be collected (retrospective study; chart reviews), or intervention administered (prospective study; etc). If any

2. Subject Selection: Of particular importance in this section are:

a) the sampling procedure to be used – random, stratified, convenience, b) the source of the subjects, c) the criteria for selection – clearly state inclusion/exclusion d) the rationale for determining sample size – use power test to determine sample size for significance; realistic estimates of crossovers, dropouts must be used in calculating sample size

3. Instrumentation or Measures: This section lists all the variables (intervention as well as outcome variables) you would be examining in your study, and describes what particular measures, or forms, or data collection sheets you will be using to measure the variables.

4. Procedures: This section provides a detailed description of the exact steps to be taken to conduct your research. This includes the procedure used to contact subjects, obtaining Informed Consent, and collecting the data.

5. Data Analysis: In this section describe the statistical tests that will be used to address the research hypotheses. Although intimidating, this section forces you to think how you will analyze (or have it analyzed) at the time the proposal is generated rather than after the data are collected. This way, you can avoid wasting time collecting data that are not analysable because they are not in the collected in the correct format.

6. Study Limitations: Describe the shortcomings and weakness of your study most likely to impact the internal validity of your study.

VII. RESULTS

In this section, you present your findings as clearly as possible. The Results section contains JUST THE FACTS: tables, figures, transcript summaries, and your description of what is noteworthy and important about these. Begin with a description of the sample. Simple demographics can be presented in tabular form. Follow with presenting your findings in terms of the research questions/hypotheses tested.

VIII. DISCUSSION

This section typically contains:

- An overview of significant findings
- A consideration of the finding in light of previous research
- A careful examination of findings that fail to support your hypotheses
- Limitations of the study that may affect the generalizability of the results
- Recommendations for further research
- Implications of study for professional practice

IX. REFERENCES

Students must cite all studies referred to in the proposal, using the APA citation method

B-5]	**Evaluation Pattern:** Total Marks: 150 Formative Assessment: 50 Marks Summative Assessment: 50 Marks **1] Formative Assessment Weightage 50 marks** 1. Project Proposal 2. Three Progress Reports 3. Final Research Project Report 4. Pre- submission Presentation a) Research Project Objectives, Research Question and Hypotheses b) Introduction and literature Review c) Methodology d) Quality of Analysis and Research, discussion and findings e) Documentation and Reporting f) References g) Reflection **2] Summative Assessment Weightage 50 marks** 1. There shall be a panel of 2 examiners for the Final Viva-Voce 2. University shall nominate External Examiners 3. Director shall nominate Internal Examiners 4. Presentation by each student along with a spiral bound report is mandatory 5. Students will deliver a presentation of 15 minutes about their OJT project. 6. Weightages for summative assessment shall be as follows a) Presentation – 05 marks b) Viva-Voce – 20 marks c) Report – 15 marks d) Ability to connect with the theoretical & conceptual frame work – 10 marks **The Internal & the External viva-voce shall evaluate the candidate based on:** 1. Adequacy of work undertaken by the student 2. Application of concepts learned in Sem I, II and III 3. Analytical capabilities 4. Technical Writing & Documentation Skills 5. Outcome of the project – sense of purpose 6. Utility of the project to the organization 7. Variety and relevance of learning experience **Presentation could be through any of the enlisted formats** (this is an indicative list and innovative formats if any beyond this list may be	

	adopted) - 1. Traditional Slide Deck Presentation 2. Infographics 3. Video presentation 4. Paper presentation 5. Poster presentation 6. Webinar or online presentation 7. TED-style presentation Storytelling Presentation etc.	
	Total	**12**

Program	MBA (Artificial Intelligence)			Semester: III				
Course	Deep learning			Course Code	MB25SCAI-405			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 405.1	REMEMBERING	Understand foundational concepts in data governance and regulatory frameworks related to AI and deep learning.
CO 405.2	UNDERSTANDING	Examine privacy and resilience issues in financial and Al-based systems through regulatory and ethical lenses.
CO 405.3	APPLYING	Evaluate ethical challenges, algorithmic fairness, and explainability in deep learning applications.
CO 405.4	ANALYSING	Explore cybersecurity strategies to secure Al systems and mitigate insider threats.
CO 405.5	EVALUATING	Apply deep learning models to real-world fintech problems and assess interpretability, faintest, and bias.

Course Contents

Unit	Description	Duration [Hrs]
I	**Fundamentals of Data Governance**: Principles & Frameworks, Introduction to Probability and its role in data governance. Concepts of uncertainty, conditional probability, and data reliability. Bayesian reasoning and its application in data governance. **Bayesian Probabilistic Networks (BPN):** structure, nodes, and relationships. Probabilistic Theory, BPN ,Role and responsibilities of Data Stewards & Chief Data Officers (CDOs) ,Data Quality, Integrity & Lifecycle Management Designing a Data Governance Framework	(7+2)
II	**Data Breaches & Incident Response** (Case Study: Capital One Data Breach)Encryption, Tokenization & Secure Data Storage, Zero Trust Security Model in Business/Institutions Insider Threats & Behavioral Analytics for Fraud Detection, Implementing Role-Based Access Control (RBAC)	(7+2)
III	**Understanding bias in AI and Machine Learning models**: Types of bias: data bias, algorithmic bias, societal bias, sampling bias, and measurement bias. Causes and impact of bias on decision-making and business ethics. Concepts of fairness, accountability, and transparency (FAT) in AI systems. **Frameworks for evaluating fairness:** group fairness, individual fairness, and counterfactual fairness. **Techniques to mitigate bias:** balanced data, fairness-aware algorithms, and ethical AI design. Role of governance and ethics boards in AI model oversight Explainability & interpretability of Neural Networks ,CNN, RNN, Transformer models and Transfer Learning, Case Study: Deep Learning	(7+2)
IV	**Overview of data privacy regulations:** GDPR (General Data Protection Regulation), CCPA, and India's Digital Personal Data Protection Act (DPDPA 2023). Understanding Consent Management – obtaining, storing, and managing user consent for data collection and processing. Principles of lawful processing and consent under GDPR: explicit, informed, specific, and revocable consent. Data Subject Rights (DSR): right to access, rectification, erasure (right to be forgotten), restriction, portability, and objection. Mechanisms for handling user consent in digital systems (web, mobile, IoT).Definition and importance of cross-border data transfer in global business operations. Key concepts: data residency, data localization, and sovereignty. **Legal frameworks governing international data transfer:** GDPR's Standard Contractual Clauses (SCCs), Binding Corporate Rules (BCRs), and adequacy decisions. Risks associated with offshore data storage – compliance, security, and political concerns. Strategies for lawful cross-border data transfers – encryption, anonymization, data-sharing agreements. Corporate governance implications for multinational enterprises	(7+2)

	(MNEs). Intersection of Artificial Intelligence (AI) and privacy rights. **Risks from automated decision-making:** profiling, surveillance, and discrimination. **Ethical principles in AI:** transparency, accountability, and fairness. Mitigating risks: anonymization, differential privacy, and privacy-preserving machine learning (PPML), TensorFlow and PyTorch basics	
V	**Ethics in AI & Machine Learning Models** Algorithmic Bias & Fairness Explainable AI (XAI) & Transparency in Decision-Making Responsible Data Use & Ethical Hacking Augmented Reality and Virtual Reality	**(7+2)**
	Total	**45**

Suggested Textbooks:

1. Ethical AI and Data Management Strategies in Marketing; Author(s): Shefali Saluja, Varun Nayyar, Kuldeep Rojhe, Sandhir Sharma; Publisher: IGI Global; Edition: 2024
2. Artificial Intelligence for Marketing Management; Author(s): Sara Quach; Publisher: CRC Press; Edition: 2023
3. Deep Learning and Ethics; Author(s): Travis LaCroix, Simon J. D. Prince; Publisher: arXiv; Edition: 2023
4. Ethical Considerations in AI-Enhanced Marketing Automation: Balancing Personalization and Responsibility; Publisher: ResearchGate; Edition: 2023

Suggested Reference Books:

4. Ethical AI and Data Management Strategies in Marketing, Shefali Saluja, Varun Nayyar, Kuldeep Rojhe, Sandhir Sharma, Publisher: IGI Global, Edition: 2024
5. Artificial Intelligence for Marketing Management, Sara Quach, Publisher: CRC Press, Edition: 2023
6. Deep Learning and Ethics, Travis LaCroix & Simon J. D. Prince, Publisher: arXiv, Edition: 2023

Suggested Online Link:

1. https://onlinecourses.nptel.ac.in/noc24_mg05/preview
2. https://onlinecourses.nptel.ac.in/noc25_hs104/preview
3. https://www.coursera.org/learn/ethics-of-artificial-intelligence
4. https://www.coursera.org/learn/responsible-and-ethical-ai

Program	MBA (Artificial Intelligence)			Semester:IV				
Course	Analytics toolkit for Decision Sciences			Course Code	MB25SEAI-406			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO406.1	REMEMBERING	Recall the basic concepts of R and Python programming, data structures, and relevant libraries/packages for data exploration.
CO406.2	UNDERSTANDING	Understand and explain Python packages and R functions used for data analysis and interpretation.
CO406.3	APPLYING	Apply R libraries to perform data visualization and exploratory data ana
CO406.4	ANALYSING	Apply Python packages to create charts, plots, and visualizations for better data insights. .
CO406.5	CREATING	Create and validate data models using R and Python for predictive or descriptive analytics.

Course Contents

Unit	Description	Duration [Hrs]
I	Introduction to R ,Need for Toolkit, Components of toolkit, R and uses, R Libraries, Downloading and installation of R, Data types	(7+2)
II	Data exploration, Elements of Data, Data importing, Data munging, Data transforming - R, Descriptive Statistics	(7+2)
III	Introduction to Python, Advantages of Python, Data importing, Python libraries, Data transforming in Python, Descriptive Statistics, Power BI and Python integration	(7+2)
IV	Functions of Numpy, Data Needs, Data Wrangling, Data frame elements, Data slicing, Testing, Streamlit basics and deployment of Python applications	(7+2)
V	Visualization, Multivariate analysis, Matplotlib, Ggplot, Seaborn library, EDA using graphics, Executive dashboards and business reporting	(7+2)
	Total	45

Suggested Text Books

1. Analytics, Data Science, & Artificial Intelligence: Systems for Decision Support, , Ramesh Sharda, Dursun Delen, Efraim Turban, Global Edition, Pearson 2020.
2. Data Analytics using Python, Bharti Motwani, Wiley, 2020.
3. Data Analytics Using R, Seema Acharya, McGraw Hill Education, 2018.
4. R for Everyone, Jared P. Lander, Pearson Education; 2nd edition, 2018.
5. R for data science, Hadley Wickham, O'Reilly; 1st edition, 2017

Suggested Reference Books:

1. Analytics, Data Science, & Artificial Intelligence: Systems for Decision Support, Ramesh Sharda, Dursun Delen, Efraim Turban, Publisher: Pearson (Global Edition), Edition: 2020
2. Data Analytics using Python, Bharti Motwani, Publisher: Wiley, Edition: 2020
3. Data Analytics Using R, Seema Acharya, Publisher: McGraw Hill Education, Edition: 2018

Suggested Online Link:

1. https://nptel.ac.in/courses/110106072
2. https://onlinecourses.nptel.ac.in/noc21_cs69/preview
3. https://www.coursera.org/specializations/practical-data-science-for-data-analysts
4. https://www.upgrad.com/us/data-science-course/

Program	MBA (Artificial Intelligence)			Semester:IV				
Course	Machine Learning & Predictive Analytics			Course Code	MB25SEAI-407			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	-	-	50	50	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO407.1	REMEMBERING	To introduce fundamental concepts and algorithms in machine learning.
CO407.2	UNDERSTANDING	To explain the role of predictive analytics in decision- making processes.
CO407.3	APPLYING	To demonstrate the use of machine learning tools for data- driven insights
CO407.4	ANALYSING	To analyze datasets and identity appropriate predictive models.
CO407.5	EVALUATING	To evaluate and Optimize machine learning models for accuracy and performance..

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction:** Understanding ML and Predictive Analytics in Business & Finance, **Types of ML**: Supervised, Unsupervised, and Reinforcement Learning (Case Study: Predicting Loan Defaults), **Model Evaluation Metrics:** Accuracy, Precision, Recall, F1 Score, ROC-AUC, **Data Preprocessing for ML:** Normalization, Feature Scaling, Encoding Categorical Data, Hands-on: Implementing a Basic Regression Model in Python for Financial Forecasting	(7+2)
II	**Linear and Logistic Regression** (Case Study: Predicting Stock Market Trends), Decision Trees & Random Forests (Case Study: Credit Risk Assessment in Lending), **Support Vector Machines (SVM)** for Classification Problems, Evaluating ML **Models using Cross-Validation, Hands-on**: Building a Credit Risk Prediction Model using Logistic Regression	(7+2)
III	**K-Means Clustering**: for Customer Segmentation, Hierarchical Clustering & DBSCAN, Principal Component Analysis (PCA) for Dimensionality Reduction (Example: Analysing Large-Scale Transaction Data), Anomaly Detection for Fraud Detection (Case Study: Identifying Fraudulent Transactions in Digital Payments), Hands-on: Clustering Customers Based on Spending Behaviours	(7+2)
IV	**Understanding Time Series Data in Finance**: Moving Averages & Exponential Smoothing (Example: Forecasting Financial KPIs), ARIMA & SARIMA for Stock Price Prediction, Prophet Model for Forecasting in Business Analytics, Prophet and LSTM models for time-series forecasting, **Hands-on:** Forecasting Revenue Trends Using Time Series Models	(7+2)
V	**Deploying ML Models** using Flask & Streamlit, **Model Explainability**: SHAP, LIME (Case Study: Making AI-Driven Credit Scoring Transparent), Bias & Fairness in Financial Predictive Models, Regulatory Guidelines for ML in Finance (Example: RBI's Stance on AI-Driven Lending), AutoML concepts and model drift monitoring, **Hands-on:** Deploying a Machine Learning Model as a Web App	(7+2)
	Total	45

Suggested Text Books

1. Machine Learning and Data Science Blueprints for Finance — Chauhan, S., & Kumar, A. (2021). Publisher: Packt Publishing, Birmingham.
2. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 2nd Edition — Aurélien Géron. Released September 2019. Publisher: O'Reilly Media, Inc.
3. Python Machine Learning — Raschka, S., & Mirjalili, V. (2017). Publisher: Packt Publishing, Birmingham.
4. Pattern Recognition and Machine Learning — Bishop, C. M. (2006). Publisher: Springer, New York.
5. The Elements of Statistical Learning: Data Mining, Inference, and Prediction — Hastie, T., Tibshirani, R., & Friedman, J. (2009). Publisher: Springer, New York.

Suggested Reference Books:

1. Advances in Financial Machine Learning — López de Prado, M. (2018). Publisher: Wiley, Hoboken, NJ.

2.Machine Learning for Algorithmic Trading: Predictive Models in Python — Jansen, J. (2020). Publisher: Packt Publishing, Birmingham.

Suggested Online Link:

1. https://onlinecourses.nptel.ac.in/
2. https://www.coursera.org/specializations/machine-learning-trading
3. https://www.coursera.org/learn/machine-learning-trading-finance
4. https://www.upgrad.com/machine-learning-courses/

Program	MBA (Artificial Intelligence)			Semester: IV				
Course	Business Intelligence			Course Code	MB25SEAI-408			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 408.1	REMEMBERING	Recall fundamental concepts of Business Intelligence (BI), data warehousing, and related technologies.
CO 408.2	UNDERSTANDING	Appraise and explain the role of BI in organizational decision-making and strategic planning.
CO 408.3	APPLYING	Design and apply techniques for data pre-processing, mining, and post-processing to extract actionable insights.
CO 408.4	ANALYSING	Analyze BI algorithms and techniques to assess their effectiveness for decision-making.
CO 408.5	EVALUATING	Evaluate and control BI methods, techniques, and algorithms to improve organizational performance.

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction To Business Intelligence:**, Introduction to Data, Classification of Data, Classification of Information, Classification of Knowledge, Classification of Data Warehouse, Role of Data Warehouse in Business Intelligence, **The Four-Step Process of Business Intelligence:** Business Applications of BI The Core Benefits of BI, Ethics in Business Intelligence, Data governance basics	(7+2)
II	**Introduction to Modelling Techniques**: Modelling Techniques, Introduction to Data Warehouse, Data Warehouse, Dimensional Modelling, Star Schema, Snowflake Schema, Fact Constellation Schema, Facts, Additive, Semi-Additive, Non-Additive, Hierarchy in Dimensions, Parent-Child Relationships, Many-to-Many Dimensional Relationship, Dimensional Modelling, Case Study.	(7+2)
III	**Pre-Processing of Data**: Data Discovery, Data Preparation, Data Cleaning, Data Integration, Data Reduction, Data Transformation, **ETL**: ETL Architecture, Extraction Concept. Concept of Transformation, Initial Loading, Incremental Loading, Late Arriving Facts, Data Marts, Cubes, Case Study.	(7+2)
IV	**Reporting and Analytics**: Reporting: Metadata, Layers of Metadata, Presentation Layer, Data Layer, Use of Different Layers & Overall Reporting Architecture, Report Elements, Charts, Tables, OLAP, MOLAP, Dashboards. Ad-hoc Reports, Analytics: Exploratory Techniques, Analytics: Statistical Techniques, Cluster Analysis, Predictive Analysis, Regression, Time Series, AI-driven insights, Case Study	(7+2)
V	**Recent Trends**: Data Analytics, BI and Social Media, Leveraging Social Media, Web Scraping Tools, Direct Interaction with Customers, Dashboarding the Data, Real-Time BI, Case Study, Operational BI, Embedded BI, GenAI automation in BI,Case Study	(7+2)
	Total	45

Suggested Textbooks

1. Business Intelligence: An Essential Beginner's Guide to BI Big Data Artificial Intelligence Cyber Security Machine Learning Data Science Data Analytics Social Media and Internet Marketing Richard Hurley IBM 2020.
2. Business Intelligence and Analytics Ramesh Sharda Dursun Delen Efraim Turban 10th Edition Pearson 2018.
3. Decision Support and Business Intelligence System Efraim Turban Ramesh Sharda Dursun Delen Pearson 2013.

Suggested Reference Book:

1. Business Intelligence: An Essential Beginner's Guide to BI, Big Data, Artificial Intelligence, Cyber Security, Machine Learning, Data Science, Data Analytics, Social Media and Internet Marketing, Richard Hurley, Publisher: IBM, Edition: 2020
2. Business Intelligence and Analytics, Ramesh Sharda, Dursun Delen, Efraim Turban, Publisher: Pearson, Edition: 10th Edition (2018)
3. Decision Support and Business Intelligence Systems, Efraim Turban, Ramesh Sharda, Dursun Delen, Publisher: Pearson, Edition: 2013

Suggested Online Link

1. https://onlinecourses.nptel.ac.in/noc24_cs65/preview
2. https://onlinecourses.nptel.ac.in/noc24_mg09/preview
3. https://www.coursera.org/learn/mooc-business-intelligence
4. https://www.coursera.org/learn/business-intelligence-tools

Program	MBA (Artificial Intelligence)			Semester:IV				
Course	Big Data Management and Security			Course Code	MB25SEAI-409			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO409.1	REMEMBERING	Recall fundamental concepts of Big Data, high-performance analytics, and related terminologies.
CO409.2	UNDERSTANDING	Understand the use of social media data as a source of Big Data and its applications in analytics.
CO409.3	APPLYING	Assess the functionality of Autonomous Artificial Intelligence systems and understand the stages of data processing in big data environment
CO409.4	ANALYSING	Analyze cyber-attack and the tools to mitigate them
CO409.5	EVALUATING	Evaluate strategies of Big data

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction to Big Data**: Concept of Big Data, The Five V's of Big Data, Big Data in the Big World, Streaming Analytics, An Overview of Big Data Solutions, Drilling into the Big Data Gold Mine, Data Fusion, High Performance Analytics for Intelligence Professionals, Introduction - The Age of Big Data and High-Performance Analytics, Technology, Challenges, data protection regulations overview (DPDP Act, GDPR basics)	(7+2)
II	**Core Concepts and Application Scenarios Big Data**: Introduction, Changing Threat Landscape, Embracing Big Data, Big Data and Law Enforcement, Advances & Implications, Lessons from an Active Shooter Case Study, The Intersection of Big Data and Law Enforcement, Case Example and Workshop Overview, Situational Awareness & Twitter as a Social Media Source of Big Data, Big Data Lens & The Advancement of Big Data Analytics After 2001, Critical Infrastructure Protection by Harnessing Big Data, Overarching Architecture	(7+2)
III	**Military and Big Data Revolution**: Risk of Collapse, Introduction to the Big Data Arena & Simple to Complex Use Cases, Canonic Real Use Cases, Time Big Data Systems, Implementing the Real-Time Big Data System, Deep Data Analytics Tools, Cybercrime & Attack Motivations, Implications for Big Data and National Security, Defining Cybercrime & Cyber Terrorism, Attack Classification and Parameters & Tools Used to Facilitate Attacks, cybersecurity for AI systems , cloud security , Case Study	(7+2)
IV	**Methods and Technological Solutions**: Requirements and Challenges for Big Data Architecture, Challenges Involved in Big Data Processing, Tools and Technologies for the Implementation of Big Data, Data Sources and Analytics, Mining Social Media, Architecture, Tools, Approaches to Detecting Criminal Activity, Text Mining, Case Study	(7+2)

V	**Literature Mining and Ontology Mapping Applied to Big Data**: Adaptive Robust Integrative Analysis for Finding Novel Associations, Conceptual Framework of ARIANA, Big Data Concerns in Autonomous AI Systems, Artificially Intelligent System Memory Management, Constructivist Learning, Practical Solutions for Secure Knowledge Development in Big Data Environments, An ABC Approach to Big Data and Security, Humans Dealing with Big Data, The Three Stages of Data Processing Explained, The Public Order Policing Model and the Common Operational Picture	(7+2)
	Total	45

Suggested Text Books:

1. Choo, Kim-Kwang Raymond, Dehghantanha, Ali (Eds.), Handbook of Big Data Privacy, Springer International Publishing, 2020, 1st Edition.
2. Fadlullah, Zubair, Khan Pathan, Al-Sakib (Eds.), Combating Security Challenges in the Age of Big Data, Springer International Publishing, 2020, 1st Edition.
3. Hu, Shiyan, Yu, Bei (Eds.), Big Data Analytics for Cyber-Physical Systems, Springer International Publishing, 2020, 1st Edition.
4. Babak Akhgar, Gregory B. Saathoff, Hamid Arabnia, Richard Hill, Andrew Staniforth, Petra Bayerl, Application of Big Data for National Security, Butterworth-Heinemann, 2015, 1st Edition.

Suggested Reference Books:

1. Big Data Security and Privacy, Abdullah M. Iliyasu, Ahmad A. Bakar, Ibrahim B. Bajah, Publisher: IGI Global, Edition: 1st Edition (2019)
2. Big Data Analytics: Turning Big Data into Big Money, Frank J. Ohlhorst, Publisher: Wiley, Edition: 1st Edition (2012)
3. Big Data Fundamentals: Concepts, Drivers & Techniques, Thomas Erl, Wajid Khattak, Paul Buhler, Publisher: Prentice Hall, Edition: 1st Edition (2016)

Suggested Online Link

1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview
2. https://www.coursera.org/learn/security-privacy-big-data
3. https://www.coursera.org/learn/security-privacy-big-data-protection
4. https://www.coursera.org/courses?query=big+data

Program	MBA (Artificial Intelligence)			Semester: IV				
Course	Natural Language Processing			Course Code	MB25SEAI-410			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks				
	Lecture	Tutorial	Practical	FA		SA	PR	Total
				UT	CA	TH		
3	2	1	1	25	25	50	-	100

Course Outcomes:

After learning the course, the students should be able to:

CO#	COGNITIVE ABILITIES	COURSE OUTCOMES
CO410.1	REMEMBERING	Define key terminologies, concepts, and techniques used in Text Mining and Natural Language Processing (NLP).
CO410.2	UNDERSTANDING	Illustrate and explain the fundamental concepts of Text Mining and NLP, emphasizing their relevance and real-world applications.
CO410.3	APPLYING	Apply appropriate frameworks to map NLP concepts (such as tokenization, POS tagging, parsing) with real-world problems
CO410.4	ANALYSING	Analyze various NLP algorithms and models, identifying suitable techniques for different text analytics tasks such as sentiment analysis or topic modeling.
CO410.5	EVALUATING	Evaluate the performance of text similarity and text classification algorithms using appropriate evaluation metrics

Course Contents

Unit	Description	Duration [Hrs]
I	**Introduction to Text Mining & NLP**, Why Should We Use Text for Analysis,Text Mining vs NLP, Challenges in NLP, Syntaxes and Semantics, Introduction to Language Models, NLP Methods & Workflow, Applications of NLP, overview of Large Language Models (GPT, Llama)	(7+2)
II	**Data Extraction** - Why Pre-process Text?, Steps in Text Pre-processing, Tokenization - Stop Words Removal, Removing HTML Tags, Emojis, Smileys etc., Stemming & Lemmatization, Text Vectorization and DTM, TF-IDF and Topic Modeling, Text Visualization	(7+2)
III	**Introduction to Word Embedding**, Limitations of Count Vectorizers, Cosine Similarity, Co-occurrence Matrix, Pre-trained Word Embeddings, Applications of Word Embeddings, embeddings for LLMs and Retrieval-Augmented Generation (RAG)	(7+2)
IV	**Introduction to Text Classification**, Text Classification Methodology, Features for Text Classification, Sentiment Analysis, Intent Detection, LLM-based text classification and generative NLP tasks	(7+2)
V	**NLP Techniques and Application**: POS Tagging, Word Sense Disambiguation, Named Entity Recognition, Chatbots, Machine Translation, Text Summarization, Natural Language Generation .	(7+2)
	Total	45

Suggested Text Books

1. Transformers for Natural Language Processing: Build Innovative Deep Neural Network Architectures for NLP with Python, PyTorch, TensorFlow, BERT, RoBERTa — Denis Rothman, Packt Publishing, 2021
2. Deep Learning in Natural Language Processing — Li Deng, Yang Liu, Springer, 2018
3. Hands-On Natural Language Processing with TensorFlow: Concepts and Applications — Michael Walker, AI Sciences LLC, 2018
4. Natural Language Processing with Python — Steven Bird, Ewan Klein, Edward Loper, O'Reilly Media, 2009

Suggested Reference Books:

1. Natural Language Processing with Transformers, Lewis Tunstall, Leandro von Werra, Thomas Wolf, Publisher: O'Reilly Media, Edition: 1st Edition (2022)
2. Neural Network Methods for Natural Language Processing, Yoav Goldberg, Publisher: Morgan & Claypool Publishers, Edition: 1st Edition (2017)
3. Deep Learning for Natural Language Processing, Palash Goyal, Sumit Pandey, Karan Jain, Publisher: Apress, Edition: 1st Edition (2018)

Suggested Online Link

1. **https://onlinecourses.nptel.ac.in/noc25_cs22/preview**
2. **https://onlinecourses.nptel.ac.in/noc23_cs45/preview**
3. **https://nptel.ac.in/courses/106105158**
4. **https://www.coursera.org/specializations/natural-language-processing**