University of Mumbai

Website – mu.ac.in
Email id - dr.aams@fort.mu.ac.in
aams3@mu.ac.in

Academic Authorities,
Meetings &Services (AAMS)
Room No. 128, M. G. Road, Fort,
Mumbai – 400 032.
Tel. 022-68320033

Re- accredited with A ++ Grade (CGPA 3.65) by NAAC
Category- I University Status awarded by UGC

No. AAMS_UGS/ICC/2025-26/31 Date: 22nd May, 2025

CIRCULAR:-

Attention of all the Principals of the Affiliated Colleges, Directors of the Recognized Institutions is invited to the revised syllabus for the Master of Architecture (Programme: M. Arch. (Project Management) CBCSGS with effect from the academic year 2016-17.

They are hereby informed that the recommendations made by the Ad-hoc Board of Studies in Architecture at its meeting held on 13th January, 2025 and subsequently passed by the Board of Deans at its meeting held on 27th January, 2025 **vide** item No. 6.7 (R) have been accepted by the Academic Council at its meeting held on 27th January, 2025 **vide** item No. 6.7 (R) and that in accordance therewith **M. Arch. (Project Management) (Sem I to IV)** is revised as per appendix with effect from the academic year 2025-26.

(The said circular is available on the University's website www.mu.ac.in).

MUMBAI – 400 032
22nd May, 2025

(Dr. Prasad Karande)
REGISTRAR

To,

The Principals of the Affiliated Colleges, Directors of the Recognized Institutions.

AC 6.7 (R)/27/01/2025

Copy forwarded with Compliments for information to:-

1) The Chairman, Board of Deans,
2) The Dean, Faculty of Science & Technology,
3) The Chairman, Board of Studies in Architecture,
4) The Director, Board of Examinations and Evaluation,
5) The Director, Department of Students Development,
6) The Director, Department of Information & Communication Technology,
7) The Director, Centre for Distance and Online Education (CDOE), Vidyanagari,
8) The Deputy Registrar, Admissions, Enrolment, Eligibility & Migration Department (AEM).

Copy forwarded for information and necessary action to :-	
1	The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Dept)(AEM), dr@eligi.mu.ac.in
2	The Deputy Registrar, Result unit, Vidyanagari drresults@exam.mu.ac.in
3	The Deputy Registrar, Marks and Certificate Unit,. Vidyanagari dr.verification@mu.ac.in
4	The Deputy Registrar, Appointment Unit, Vidyanagari dr.appointment@exam.mu.ac.in
5	The Deputy Registrar, CAP Unit, Vidyanagari cap.exam@mu.ac.in
6	The Deputy Registrar, College Affiliations & Development Department (CAD), deputyregistrar.uni@gmail.com
7	The Deputy Registrar, PRO, Fort, (Publication Section), Pro@mu.ac.in
8	The Deputy Registrar, Executive Authorities Section (EA) eau120@fort.mu.ac.in He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
9	The Deputy Registrar, Research Administration & Promotion Cell (RAPC), rapc@mu.ac.in
10	The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA) dy.registrar.tau.fort.mu.ac.in ar.tau@fort.mu.ac.in
11	The Deputy Registrar, College Teachers Approval Unit (CTA), concolsection@gmail.com
12	The Deputy Registrars, Finance & Accounts Section, fort draccounts@fort.mu.ac.in
13	The Deputy Registrar, Election Section, Fort drelection@election.mu.ac.in
14	The Assistant Registrar, Administrative Sub-Campus Thane, thanesubcampus@mu.ac.in
15	The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan, ar.seask@mu.ac.in
16	The Assistant Registrar, Ratnagiri Sub-centre, Ratnagiri, ratnagirisubcentar@gmail.com
17	The Director, Centre for Distance and Online Education (CDOE), Vidyanagari, director@idol.mu.ac.in
18	Director, Innovation, Incubation and Linkages, Dr. Sachin Laddha pinkumanno@gmail.com
19	Director, Department of Lifelong Learning and Extension (DLLE), dlleuniversityofmumbai@gmail.com

Copy for information :-	
1	P.A to Hon'ble Vice-Chancellor, vice-chancellor@mu.ac.in
2	P.A to Pro-Vice-Chancellor pvc@fort.mu.ac.in
3	P.A to Registrar, registrar@fort.mu.ac.in
4	P.A to all Deans of all Faculties
5	P.A to Finance & Account Officers, (F & A.O), camu@accounts.mu.ac.in

To,

1	The Chairman, Board of Deans pvc@fort.mu.ac.in
2	**Faculty of Humanities,** **Offg. Dean** 1. Prof.Anil Singh Dranilsingh129@gmail.com **Offg. Associate Dean** 2. Prof.Manisha Karne mkarne@economics.mu.ac.in 3. Dr.Suchitra Naik Naiksuchitra27@gmail.com
	Faculty of Commerce & Management, **Offg. Dean,** 1 Prin.Ravindra Bambardekar principal@model-college.edu.in **Offg. Associate Dean** 2. Dr.Kavita Laghate kavitalaghate@jbims.mu.ac.in 3. Dr.Ravikant Balkrishna Sangurde Ravikant.s.@somaiya.edu 4. Prin.Kishori Bhagat kishoribhagat@rediffmail.com

	Faculty of Science & Technology **Offg. Dean** 1. Prof. Shivram Garje ssgarje@chem.mu.ac.in **Offg. Associate Dean** 2. Dr. Madhav R. Rajwade Madhavr64@gmail.com 3. Prin. Deven Shah sir.deven@gmail.com
	Faculty of Inter-Disciplinary Studies, **Offg. Dean** 1.Dr. Anil K. Singh aksingh@trcl.org.in **Offg. Associate Dean** 2.Prin.Chadrashekhar Ashok Chakradeo cachakradeo@gmail.com 3. Dr. Kunal Ingle drkunalingle@gmail.com
3	Chairman, Board of Studies,
4	The Director, Board of Examinations and Evaluation, dboee@exam.mu.ac.in
5	The Director, Board of Students Development, dsd@mu.ac.in DSW direcotr@dsw.mu.ac.in
6	The Director, Department of Information & Communication Technology, director.dict@mu.ac.in

AC – 27/01/2025
Item No. – 6.7(R)

University of Mumbai

Revised Syllabus for

Master of Architecture Programme:

M. Arch. (Project Management)

Semester – (I to IV)

(Choice Based Credit System)

(With effect from the academic year 2025-26)

University of Mumbai

Syllabus for Approval

Sr. No.	Heading	Particular
1	O: _____ Title of Course	M. Arch. (Project Management)
2	O: _____ Eligibility	As per University Ordinance
3	O: _____ Standard of Passing	50% Smita Dalvi
4	No. of years/Semesters:	2 Years/4 Semesters
5	Level:	P.G
6	Pattern:	Semester
7	Status:	Revised
8	To be implemented from Academic Year :	From Academic Year: 2025-2026

Smita Dalvi

Dr. Smita Dalvi
Chairman,
Ad-hoc Board of Studies, in

Dr. Deven Shah
Associate Dean,
Faculty of Science and Technology

Garje

Prof. Shivram Garje
Dean,
Faculty of Science and Technology

Master of Architecture (M. Arch)

in Project Management

Preamble:

In today's dynamic and complex business environment, effective project management has become a critical component of organizational success. Mumbai University's 2-year PG Programme in Project Management aims to cultivate not only technical proficiency but also leadership qualities, ethical considerations, and a global perspective, preparing postgraduates to excel in diverse project environments. We are committed to developing future leaders who will contribute to the advancement of project management practices and drive positive change in their organizations and the profession.

This revised syllabus for the Post Graduate degree in Master of Architecture (Project Management) is designed to equip learners with the essential skills, knowledge, and competencies required to lead, manage, and execute projects in the construction industry.

The curriculum emphasizes a blend of theoretical foundations and practical applications, fostering an understanding of project lifecycle management, strategic planning, risk assessment, and stakeholder engagement. Through a combination of interactive learning, case studies, and real-world projects, learners will develop the ability to navigate challenges and drive innovation in their respective fields.

In response to the evolving demands of the marketplace, the revised syllabus incorporates choice-based electives, allowing learners to tailor their educational experience according to their interests and career aspirations. These electives provide opportunities for specialized knowledge in areas such as Agile Project Management, Risk Management, and Sustainability in Projects, fostering a more personalized educational journey. This flexibility not only enhances learner engagement but also prepares graduates to be versatile leaders in the dynamic field of project management.

The revised syllabus also brings the course, credits and marks structure in harmony with other PG programmes in Architecture, devised in line with the latest guidelines from the Council of Architecture (COA), available in 'Minimum Standards of Architectural Education-Post-graduate', vide CA/5/Academic/2022/Circular-PG Guidelines, dated December 14, 20222.

Dr. Smita Dalvi BoS (Ad hoc)-Chairman- Architecture	**Prof. Chakor Mehta** Chairperson Sub-committee

Program Specific Outcomes:

- Graduates will develop advanced project management skills, including planning, scheduling, budgeting, and risk management.
- Graduates will be able to lead and manage multidisciplinary teams effectively, fostering collaboration and achieving project goals.
- Graduates will enhance their problem-solving skills to address complex project challenges and find innovative solutions.
- Graduates will demonstrate ethical and professional conduct in all project-related activities, adhering to industry standards and best practices.
- Graduates will understand the impact of projects on the environment and society, promoting sustainable practices in project management.
- Graduates will develop a global perspective on project management, recognizing the importance of cultural, economic, and regulatory differences in international projects.

Notes on the Courses:

- The programme consists of four semesters. Courses in the first three semesters are devised in the categories of Core Courses, Choice Based Electives, and Studio Courses. In the fourth semester, besides electives, the students will mainly focus on their final thesis project.
- The core courses are of 3 credits each, they are meant to impart the core knowledge of the discipline.
- There are a total of six elective courses of 2 credits each spread across 4 semesters. Individual colleges will offer electives from which the student would choose as per their own interest. The colleges will design and develop the topics, objectives and contents of choice based elective courses based on the institutional vision and strength. For this, courses from SWAYAM- NPTEL platforms can be also be explored for supplementary learning or for credit transfer.
- The studio courses are of two types – Major courses and studio exercises will drive the principal objectives of Project Management in semesters 1 to 3. Allied Studios are meant to suitably supplement the program needs. While the objectives and contents are specified for the studio courses, individual colleges will devise their studio problems based on their vision and strength.
- Two core courses of 2 credits each are devoted to research methods, developing research proposals and learning the ropes of conducting and writing research. This is done to provide a sound grounding to the students at Masters level to engage in research, to produce new knowledge and contribute to the innovations ecosystem in the profession.
- As per the Council of Architecture's (COA) guidelines in their Minimum Standard of Education, colleges and institutions imparting the UG and PG programmes in Architecture should have sufficient freedom to chart their directions. As such, the syllabus refrains from over-prescription, particularly for the term work and sessional work, where the course outcomes and details of exercises are to be worked out by the colleges.

Suggested Choice Based Electives for M.Arch. in Project Management

- Business Development & Project Marketing
- Building Automation
- Marketing in Real Estate
- Site Safety Management
- Energy Management
- Services co-ordination
- Environmental Impact Assessment
- Management Information Systems
- Risk Management
- Disaster Management
- Standardisation and Certification
- Sustainable Building Practices
- Alternative Construction Technologies
- International Project Management
- Real Estate Economics
- Building Information Modelling
- Project Site Feasibility
- Intelligent Building Systems
- Green Building Performance & Compliance
- Infrastructure Planning & Management
- Professional Communication & Ethics

Total Credits of M. Arch. (Project Management) programme				
Semester - I	21 Credits		Semester - III	21 Credits
Semester - II	21 Credits		Semester - IV	20 Credits
TOTAL	**83 Credits**			

	SEMESTER I Exam Conducted by Individual College on behalf of the University								
COURSE CODE	**COURSE NAME**	**TEACHING SCHEME (HRS)**				**CREDITS**	**EXAMINATION SCHEME**			
		L	T	S	TOTAL		Theory	Int	Ext	Total
PM-C 101	Principles of Management and Business Organisations	3	--	--	3	3	50	50	--	100
PM-C 102	Law -1 : Legal Framework for Construction	3	--	--	3	3	50	50	--	100
PM-C 103	Operation Research	3	--	--	3	3	50	50	--	100
PM-E 104	Choice Based Elective - 1	2	--	--	2	2	--	100	--	100
PM-E 105	Choice Based Elective - 2	2	--	--	2	2	--	100	--	100
PM-S 106	Project Planning & Scheduling Methods	1	--	8	9	5	--	150	150	300
PM-S 107	Computer Applications in Construction Management-1	--	--	6	6	3	--	200	--	200
					TOTAL	**28**	**21**			**1000**

	SEMESTER II Exam Conducted by the University								
COURSE CODE	**COURSE NAME**	**TEACHING SCHEME (HRS)**				**CREDITS**	**EXAMINATION SCHEME**			
		L	T	S	TOTAL		Theory	Int	Ext	Total
PM-C 201	Project Accounts and Economics	3	--	--	3	3	50	50	--	100
PM-C 202	Law 2: Contract Management	3	--	--	3	3	50	50	--	100
PM-C 203	Facility, Equipment & Personnel Management	3	--	--	3	3	50	50	--	100
PM-C 204	Research Methods - 1	2	--	--	2	2	--	100	--	100
PM-E 205	Choice Based Elective - 3	2	--	--	2	2	--	100	--	100
PM-S 206	Advanced Construction Materials and Methods	1	--	8	9	5	--	150	150	300
PM-S 207	Computer Applications in Construction Management-2	--	--	6	6	3	--	200	--	200
					TOTAL	**28**	**21**			**1000**

	SEMESTER III Exam Conducted by Individual College on behalf of the University									
COURSE CODE	**COURSE NAME**	**TEACHING SCHEME (HRS)**				**CREDITS**	**EXAMINATION SCHEME**			
		L	T	S	TOTAL		Theory	Int	Ext	Total
PM-C 301	Project Appraisal and Finance Management	3	--	--	3	3	50	50	--	100
PM-C 302	Quality & Safety Management	3	--	--	3	3	50	50	--	100
PM-C 303	Managerial Decision Making	3	--	--	3	3	50	50	--	100
PM-C 304	Research Methods -2	2	--	--	2	2	--	100	--	100
PM-E 305	Choice Based Elective - 4	2	--	--	2	2	--	100	--	100
PM-S 306	Construction Management Studio	1	--	8	9	5	--	150	150	300
PM-S 307	Advanced Contracts, Tendering and Public Procurement	--	--	6	6	3	--	200	--	200
					TOTAL	**28**	**21**			**1000**

	SEMESTER IV Exam Conducted by the University									
COURSE CODE	**COURSE NAME**	**TEACHING SCHEME (HRS)**				**CREDITS**	**EXAMINATION SCHEME**			
		L	T	S	TOTAL		Theory	Int	Ext	Total
PM-E 401	Choice Based Elective - 5	2	--	--	2	2	--	100	--	100
PM-E 402	Choice Based Elective - 6	2	--	--	2	2	--	100	--	100
PM-S 403	Dissertation	6	8	12	26	16	--	400	400	800
					TOTAL	**20**				**1000**

Note :

1 Credit = 1 Lecture Hour or 2 Tutorial/Studio Hours for duration of 16 Weeks per semester.

SEMESTER-WISE COURSE DESCRIPTION

SEMESTER-I

	SEMESTER I Exam Conducted by Individual College on behalf of the University					
Course Code	**Course Name**	**Teaching Scheme (HRS)**				
		L	T	S	TOTAL	CREDITS
PM-C101	Principles of Management and Business Organisations	3	--	--	3	3
PM-C102	Law -1 : Legal Framework for Construction	3	--	--	3	3
PM-C103	Operation Research	3	--	--	3	3
PM-E104	Choice Based Elective - 1	2	--	--	2	2
PM-E105	Choice Based Elective - 2	2	--	--	2	2
PM-S 106	Project Planning & Scheduling Methods	1	--	8	9	5
PM-S 107	Computer Applications in Construction Management-1	--	--	6	6	3
		Total/Semester			**29**	**21**

SEMESTER I Exam Conducted by Individual College on behalf of the University					
Course Code	**Course Name**	**Examination Scheme**			
		Theory Paper	Internal	External Viva	Total Marks
PM-C101	Principles of Management and Business Organisations	50	50	--	100
PM-C102	Law -1 : Legal Framework for Construction	50	50	--	100
PM-C103	Operation Research	50	50	--	100
PM-E104	Choice Based Elective - 1	--	100	--	100
PM-E105	Choice Based Elective - 2	--	100	--	100
PM-S 106	Project Planning & Scheduling Methods	--	150	150	300
PM-S 107	Computer Applications in Construction Management-1	--	200	--	200
				TOTAL	**1000**

PM-C 101 Management Theories - Principles & Practices

Course Title	Management Theories - Principles & Practices					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 101	3	3	50	50	--	100

Course Objectives:

- To provide learner with a comprehensive understanding of fundamental management principles and theories applicable to construction projects.
- To equip learners with the ability to design and implement effective organizational structures that enhance project execution and stakeholder collaboration.
- To foster leadership skills necessary for motivating and guiding diverse teams in high-pressure construction environments.
- To provide knowledge on financial management principles, budgeting, and cost control specific to construction projects.
- To cultivate strategic thinking skills that allows learner to analyse market forces and develop business strategies for construction organizations.
- To instil a mind-set of continuous improvement through performance measurement and quality management practices.

Course Contents:

- Introduction to Management: Overview, Concepts Functions and decision-making process of Management
- Organizational Structure, Design, Project Teams and Stakeholder Engagement
- Leadership Theories and Styles
- Financial Management in Construction: Budgeting and Cost Control
- Financial Analysis and Reporting
- Strategic Management and Business Development
- Performance Measurement and Continuous Improvement
- Case Studies on Successful Project Management Practices in Construction

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-C 102 Law-1: Legal Framework for Construction

Course Title	Law-1: Legal Framework for Construction					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 102	3	3	50	50	--	100

Course Objectives:

- To provide students with a comprehensive understanding of the Indian legal system and its relevance to construction project management
- To equip students with the ability to analyze and interpret various types of contracts used in the construction industry.
- To familiarize students with key laws and regulations governing construction practices in India, including environmental and labor laws.
- To develop skills in identifying, managing, and resolving legal disputes through various mechanisms, including ADR and litigation.
- To instil knowledge of the necessary permits, licenses, and compliance requirements for construction projects in India.
- To enable students to identify and assess legal risks and liabilities associated with construction projects, and to understand insurance implications.
- To encourage critical thinking about emerging legal issues in construction, including technology's impact and sustainable practices.

Course Contents:

- Introduction and overview to Legal Framework and Legal System in India
- Contract Law in Construction: Types of Contracts, Key Elements and Interpretation of Contracts in the Construction Industry
- Construction Laws and Regulations: Major Laws Governing Construction in India (e.g., The Indian Contract Act, The Arbitration and Conciliation Act), Environmental Laws and Regulations, Building Codes and Safety Regulations, Labor Laws Affecting Construction Projects
- Dispute Resolution Mechanisms: Alternative Dispute Resolution (ADR) Methods: Mediation, Arbitration, Conciliation, Role of the Judiciary in Construction Disputes, Understanding the Arbitration Process in India
- Regulatory Compliance and Permits: Role of Regulatory Bodies, Necessary Permits and Licenses, Compliance with Environmental and Safety Standards, Consequences of Non-Compliance in Construction Projects
- Risk Management and Liability: Legal Risks in Construction Project Management, Understanding Liability: Contractual vs. Tortious, Insurance Requirements and Coverage in Construction, Risk Mitigation Strategies
- Emerging Legal Issues in Construction: Impact of Technology on Construction Law (e.g., BIM, Digital Contracts), Legal Aspects of Sustainable Construction Practices, International Laws and Standards Affecting Indian Construction Projects, Case Studies on Legal Challenges in Construction

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-C 103 Operation Research

Course Title	Operation Research					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 103	3	3	50	50	--	100

Course Objectives:

- To develop analytical skills necessary effective decision-making in project management.
- Familiarize learners with various Operations Research methodologies, including linear programming, simulation, and queuing theory.
- How to maximize efficiency and minimize costs through effective resource optimization strategies.
- Enable learner to analyse risks and uncertainties in projects using Operations Research techniques.
- To develop a data-centric approach to project management, emphasizing empirical evidence in decision-making processes.
- Highlight the applications of Operations Research across various fields to broaden learners' perspectives.
- To adopt practical examples to demonstrate the application of Operations Research techniques in real project management scenarios.

Course Contents:

- Introduction and overview to Operations Research, its role in Construction Management
- Optimization Techniques: Linear Programming - Graphical and simplex methods, Integer and Binary Programming - Applications in project selection and scheduling, Non-linear Programming - Techniques and real-world applications
- Simulation and Modelling: Purpose and applications in project management, Monte Carlo Simulation - Risk analysis and uncertainty modelling, System Dynamics - Modelling project processes and feedback loops
- Decision Analysis and Risk Management: Decision-Making Under Uncertainty - Decision trees and payoff matrices, Risk Assessment Techniques- Identifying and quantifying project risks, Sensitivity Analysis - Understanding the impact of variable changes on project outcomes
- Queuing Theory and Project Scheduling: Queuing Models, Project Scheduling Techniques, Resource Levelling and Allocation
- Real-World Applications and Case Studies: Case Study Analysis - In-depth examination of real-world projects utilizing OR techniques

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-E 104 Choice Based Elective - 1

Course Title	Choice Based Elective - 1					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-E 104	2	2	--	100	--	100

Course Contents:

Individual colleges will offer electives from which the student would choose as per their own interest. The colleges should design and develop the topics, objectives and contents of choice based elective courses based on their vision and strength. Sessional work for internal evaluation should be carried out in accordance with the course contents. Suggested exercises could be in the form of case study presentations, project work, essays, debates, seminar, quizzes or class tests.

PM-E 105 Choice Based Elective - 2

Course Title	Choice Based Elective - 2					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-E 105	2	2	--	100	--	100

Course Contents:

Individual colleges will offer electives from which the student would choose as per their own interest. The colleges should design and develop the topics, objectives and contents of choice based elective courses based on their vision and strength. Sessional work for internal evaluation should be carried out in accordance with the course contents. Suggested exercises could be in the form of case study presentations, project work, essays, debates, seminar, quizzes or class tests.

..PM-S 106 Project Planning & Scheduling Methods

Course Title	Project Planning & Scheduling Methods					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-S 106	8	5	--	150	150	300

Course Objective

- Equip students with the skills to create detailed project plans that encompass scope, objectives, timelines, and resource allocation.
- Enable students to apply various scheduling methodologies,
- Familiarize students with industry-standard project management software tools.
- Teach students to identify potential risks in project schedules and develop effective mitigation strategies to ensure project success.
- Provide students with techniques for monitoring project progress.
- Foster effective communication techniques for presenting project plans and updates to stakeholders, ensuring clarity and engagement throughout the project lifecycle.

Course Contents:

- Advanced Concepts in Project Management, trends and innovations
- Detailed Project Planning, Setting SMART objectives and defining project scope
- Work Breakdown Structure (WBS) creation and its significance
- Advanced Scheduling Techniques: Critical Path Method (CPM) and Program Evaluation Review Technique (PERT), Time-cost trade-offs and crashing techniques, Advanced Gantt charts for multi-phase projects
- Resource Management and Optimization
- Risk Management
- Earned Value Management (EVM)
- Monitoring, Controlling, and Reporting
- Case Studies and Real-World Applications

Sessional Work:
Assignments, Case Studies, Studio exercises in planning and scheduling using Project Management Softwares.

PM-S 107 Computer Applications in Construction Management-1

Course Title	Computer Applications in Construction Management-1					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-S 107	6	3	--	200	--	200

Course Objectives

- Introduce students to a range of project management software tools to enhance their digital skills in project planning.
- Equip students with the skills to create, modify, and manage project schedules using digital tools, ensuring efficient resource allocation and timeline management.
- Teach students how to utilize software for monitoring project progress, tracking milestones, and managing deliverables effectively.
- Introduce techniques for data analysis and visualization using software tools, allowing students
- to interpret project data and make informed decisions.

Course Contents:

Introduction to Project Management Softwares and digital tools and training in using them.

Scheduling Techniques and using software to create Gantt charts and timelines, Resource Allocation and Management plans, Project Monitoring Project Progress, Report Generation and Documentation

Some important and essential software used in Project Management

- Project Management Information Systems (PMIS) like: Procore, PlanGrid, Oracle Primavera
- Building Information Modeling (BIM) software: Autodesk Revit, Graphisoft ArchiCAD
- Scheduling and planning tools: Microsoft Project, Oracle Primavera P6, Asta Powerproject
- Collaboration and communication platforms: Microsoft Teams, Slack
- Cost estimation and management software: Sage Estimating, PlanGrid
- Document management and control systems: SharePoint, Procore, Aconex
- Risk management and quality control tools: @RISK, Riskonnect
- Data analytics and reporting software: Tableau, Power BI, Excel

Sessional Work:
Studio exercises using Project Management Softwares.

SEMESTER-II

	SEMESTER II Exam Conducted by the University					
Course Code	**Course Name**	**Teaching Scheme (HRS)**				
		L	T	S	TOTAL	CREDITS
PM-C 201	Project Finance Management	3	--	--	3	3
PM-C 202	Law 2: Contract Management	3	--	--	3	3
PM-C 203	Facility and Equipment Management	3	--	--	3	3
PM-C 204	Research Methods - 1	2	--	--	2	2
PM-E 205	Choice Based Elective - 3	2	--	--	2	2
PM-S 206	Advanced Construction Materials and Methods	1	--	8	9	5
PM-S 207	Computer Applications in Construction Management-2	--	--	6	6	3
		Total/Semester			**28**	**21**

SEMESTER II Exam Conducted by the University					
Course Code	**Course Name**	**Examination Scheme**			
		Theory Paper	Internal	External Viva	Total Marks
PM-C 201	Project Finance Management	50	50	--	100
PM-C 202	Law 2: Contract Management	50	50	--	100
PM-C 203	Facility and Equipment Management	50	50	--	100
PM-C 204	Research Methods - 1	--	100	--	100
PM-E 205	Choice Based Elective - 3	--	100	--	100
PM-S 206	Advanced Construction Materials and Methods	--	150	150	300
PM-S 207	Computer Applications in Construction Management-2	--	200	--	200
				TOTAL	**1000**

PM-C 201 Project Accounts & Economics

Course Title	Project Accounts & Economics					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 201	3	3	50	50	--	100

Objectives:

- To gain a robust understanding of how financial and economic principles applicable in construction projects.
- To understand theories and techniques that are used to manage costs, optimize resources, and ensure financial success.

Course Contents:

- Introduction to Management Accounting, Concept of Control, Status Relationship Between Management Accounting and Top-Level Managements.
- Accounting Mechanism: Accounting Mechanism & Accounting Practices in India. Preparing of Financial Statements, Accounting Policies with Special References to Revenue Recognition Matching Expenses and Revenue & Depreciation
  Accounting
- Financial Statements and Their Analysis: Understanding of Financial Statements and Their Analysis, Like Balance Sheet, Profit & Loss Account, Ratio Analysis, Fund Flow Analysis, Statement of Changes In Financial Position.
- Cost Estimating and Budgeting: Types of costs, Methods of cost estimating, Preparing and managing a project budget, Cost control techniques
- Taxation and Legal Aspects in Construction Economics: Statutory Requirements for taxation, Accounting and Auditing.
- Accounting Types: Inflation Accounting, Creative Accounting, Social Accounting and Social Audit
- Corporate Reporting Practices in India.

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-C 202 Law 2: Contract Management

Course Title	Law 2: Contract Management					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 202	3	3	50	50	--	100

Objectives:

- To gain a thorough understanding of the principles, processes, and tools required for managing contracts effectively in construction projects,
- To gain knowledge about legal compliances related to construction contacts leading to project success.
- To understand concepts of contract administration and office management
- To gain knowledge of dispute resolution processes related to construction contracts.

Course Contents:

- Introduction to Contract Management: Overview of contract management in construction projects, Importance of effective contract management for project success, Key stages in the contract lifecycle: formation, execution, and closure
- Construction Contracts: Types of Construction Contracts, Contract selection criteria based on project scope, budget, and risk, Contract Formation – components of a contract, Negotiation strategies.
- Contract Management: bid cycle, contract conditions interpretation by parties to contract, obligation and responsibilities of the parties, protection and indemnification, bonds and insurance
- Contract Administration: inspection of work, change of work, rejected work and deficiencies, deviations extra claim and their management, project closure
- Dispute Resolution and Claims Management: Types of disputes in construction contracts: delay, quality, payment, Procedures for resolving disputes: negotiation, mediation, arbitration, litigation, Claims management process: documentation, notification, and settlement
- Office Management: proper record keeping in contract administrating, establishment of standard procedure, coordination between various agencies involve, providing data for contract clauses.

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-C 203 Facility, Equipment & Personnel Management

Course Title	Facility, Equipment & Personnel Management					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 203	3	3	50	50	--	100

Objectives:

- To gain a comprehensive understanding of the key principles, practices, and tools required for effective management of facilities, equipment and personnel in construction settings.
- To appreciate costing and phases of lifecycle of facility and equipment, their operation and maintenance
- To understand the values of human resource in construction industry and issues faced by construction labour.

Course Contents:

- Facility Management: Operation and Maintenance of facility, Facility life cycle management, Phases of facility lifecycle- planning, design, construction, operation, and decommissioning, Managing energy and utility systems.
- Equipment Management:
  Mechanization on construction projects, Sizing, and matching of equipment, Selection and Planning for equipment, Estimating output of an equipment, Owning, hiring, leasing of construction equipment, Equipment maintenance, Cost of use of equipment, Life of equipment, Physical, Economic, & usefulness, Depreciation, Replacement of equipment
- Human Resources Management: importance of human resources, Sources of personnel staffing & recruitments, job analysis, job specification, recruitments tests, selection & placement, need for training, training objectives, strategies and methods training assessment, performance appraisal, compensation, basic pay, variable pay, merit rating, job evaluation
- Labour Issues: definition of labour and labour welfare, contract labour & temporary labour, various theories, historical development, agencies for labour welfare.
- Industrial Relations: strikes, lockouts, lay-offs, grievance functions, meaning, grievance redressal procedures, collective bargaining, trade unions, overview of statutory measures for labour welfare.

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-E 204 Research Methods - 1

Course Title	Research Methods - 1					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 204	2	2	--	100	--	100

Objectives:
Introduction to the basics of research methods shall help students to set the systematic procedures for exploring, investigating, understanding, and writing of issues in Landscape Design and related areas in an objective manner.

Course Contents:

- Purpose of research
- Data, Information and Knowledge
- Method and Methodology
- Literature Review
- Qaulitative and Quantitative Research Methods
- Forms of Academic Writing
- Ethics of research and academic writing
- Citations and referencing styles

The course explores the fundamental principles, methods and process of research. The course enables the students to examines the need for research and methods to carry out the research. At the end students shall be able to understand, how to frame the research questions and execute the data and analyse them. They will also learn about ethics of conducting research and that of academic writing – such as confidentiality, consent, privacy, plagiarism, attribution, citations and referencing.

Sessional Work for internal evaluation:
The individual colleges will detail the exercises based on, but not restricted to the following pointers:

- Applications of qualitative and quantitative survey methods
- Research Essay/Paper

PM-E 205 Choice Based Elective - 3

Course Title	Choice Based Elective - 3					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-E 205	2	2	--	100	--	100

Course Contents:

Individual colleges will offer electives from which the student would choose as per their own interest. The colleges should design and develop the topics, objectives and contents of choice based elective courses based on their vision and strength. Sessional work for internal evaluation should be carried out in accordance with the course contents. Suggested exercises could be in the form of case study presentations, project work, essays, debates, seminar, quizzes or class tests.

PM-S 206 Advanced Construction Materials and Methods

Course Title	Advanced Construction Materials and Methods					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-S 206	8	5	--	150	150	300

Objectives:

- To learn about advancements in construction materials and their application in the industry.
- To gain knowledge of recent advances in Material Science
- To gain knowledge of cutting-edge construction methods, techniques and practices
- To gain an understanding about building systems in specialised building types and facilities

Course Contents:

- Conceptual Understanding of various large span structures, like Geodesic domes, hyperbolic paraboloids, and free form shapes etc. used for Airports, Stadia, Industrial buildings, public spaces etc. Construction details understanding, Service systems, Structural Systems, Sequence of erection and facilitating maintenance of such structures. Identify specialized equipment required for erection of such structures. Case studies of such structures and reporting.
- Study of advance building materials like Special alloys of steel & other metals, glass, polymer, fabric, Various types of finishes & treatments, Construction chemicals, specially manufactured items from manufacturers catalogues, etc. and specialized equipment required for erection used in erection of structures mentioned in Block 1 above. Market survey and collection of information about the materials.
- Conceptual Understanding of High-rise buildings in normal and adverse conditions considering topography of the site, for erection of such structures. Case study/ies of such structures and reporting. Water-logging, marine structures, et. Construction details understanding, Service systems, Structural Systems, Sequence of erection and facilitating maintenance of such structures. Identify specialized equipment required
- Conceptual Understanding of Pre-fabrication in building construction. Concept of Modular co-ordination. Construction details understanding, Service systems, Structural Systems, Sequence of erection and facilitating maintenance of such structures. Essential process of manufacturing, handling of pre-fabricated components. Identify specialized equipment required for erection of such structures. Case study/ies of such structures and reporting.

Sessional Work:
Studio Assignments, Case Studies, Report, Group Projects and Presentations.

PM-S 207 Computer Applications in Construction Management-2

Course Title	Computer Applications in Construction Management-2					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-S 207	6	3	--	200	--	200

Course Objectives:

This course is the part-2 of training the students in Computer Applications.

- Training in a range of project management software tools to enhance their digital skills in project planning, scheduling, and monitoring.
- Enable students to generate comprehensive project reports and dashboards using software tools, facilitating better communication and stakeholder engagement.
- Integration of digital skills into overall project management practices, emphasizing the importance of technology in modern project environments

Course Contents:

Advanced Project Management Softwares and digital tools and training in using them.

Advanced Scheduling Techniques and using software for scheduling, Resource Allocation and Management plans, Project Monitoring Project Progress, Report Generation and Documentation.

Some important and essential software used in Project Management

- Project Management Information Systems (PMIS) like: Procore, PlanGrid, Oracle Primavera
- Building Information Modeling (BIM) software: Autodesk Revit, Graphisoft ArchiCAD
- Scheduling and planning tools: Microsoft Project, Oracle Primavera P6, Asta Powerproject
- Collaboration and communication platforms: Microsoft Teams, Slack
- Cost estimation and management software: Sage Estimating, PlanGrid
- Document management and control systems: SharePoint, Procore, Aconex
- Risk management and quality control tools: @RISK, Riskonnect
- Data analytics and reporting software: Tableau, Power BI, Excel

Sessional Work:
Studio exercises using Project Management Softwares.

SEMESTER – III

	SEMESTER III Exam Conducted by Individual College on behalf of the University					
Course Code	**Course Name**	**Teaching Scheme (HRS)**				
		L	T	S	TOTAL	CREDITS
PM-C 301	Project Appraisal and Finance Management	3	--	--	3	3
PM-C 302	Quality & Safety Management	3	--	--	3	3
PM-C 303	Managerial Decision Making	3	--	--	3	3
PM-C 304	Research Methods -2	2	--	--	2	2
PM-E 305	Choice Based Elective - 4	2	--	--	2	2
PM-S 306	Construction Management Studio	1	--	8	9	5
PM-S 307	Advanced Contracts, Tendering and Public Procurement	--	--	6	6	3
		Total/Semester			**29**	**21**

SEMESTER III Exam Conducted by Individual College on behalf of the University					
Course Code	**Course Name**	**Examination Scheme**			
		Theory Paper	Internal	External Viva	Total Marks
PM-C 301	Project Appraisal and Finance Management	50	50	--	100
PM-C 302	Quality & Safety Management	50	50	--	100
PM-C 303	Managerial Decision Making	50	50	--	100
PM-C 304	Research Methods -2	--	100	--	100
PM-E 305	Choice Based Elective - 4	--	100	--	100
PM-S 306	Construction Management Studio	--	150	150	300
PM-S 307	Advanced Contracts, Tendering and Public Procurement	--	200	--	200
				TOTAL	**1000**

PM-C 301 Project Appraisal & Finance Management

Course Title	Project Finance Management					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 301	3	3	50	50	--	100

Objectives:

- To offers students a solid understanding of the financial principles, tools, and techniques necessary for the successful appraisal and financial management of construction projects.
- To emphasise the importance of sound financial planning, risk management, and strategic decision-making.
- To introduce the concepts of working capital and its management
- To learn about the workings of financial institutions in India

Course Contents:

- Project Formulation: Investment opportunities generation and screening of project ideas, project identification, project rating, preliminary analysis, market, technical, financial, economic and ecological pre-feasibility report, project estimates and technoeconomic feasibility report, detailed project report, different project clearances.
- Project Estimation: importance of estimation, method of cost estimating, parameter cost estimating, cost capacity factor, detailed cost estimation, provision of escalation, inflation provision and operation of contingency Provisions.
- Project Costing: Project cash flows, time value of money, cost of capital.
- Project appraisal: NPV, BCC, IRR, ARR, urgency, payback period, assessment of various methods Indian practice of investment appraisal as followed by institutions for private projects and for government projects, international practice of appraisal analysis of risk, different method, selection of project and risk analysis in practice.
- Working Capital Management: policy for working capital, estimating working capital needs, inventory management, accounts receivable, credit and cash management, managing payments to supplies and outstanding
- Working Capital Needs: sources, procedures, practices in construction business capital investment & budgeting, capital investment decisions, techniques of capital budgeting, types of budgets, procedure for master budget, key factor, budget manual, new approach to budgeting, cash flow forecasts.
- Long term financing: working of financial institutes in India and abroad, self-financing stock exchanges types of securities, borrowings and debentures relevant laws, laws concerning income tax, sales tax, professional tax turnover tax, etc.

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-C 302 Quality & Safety Management

Course Title	Quality & Safety Management					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 302	3	3	50	50	--	100

Objectives:

- To provide a comprehensive understanding of the essential principles, tools, and practices in quality management specific to construction projects.
- To understand the value of ensuring consistent high standards, compliance, and customer satisfaction throughout the project lifecycle.

Course Contents:

- Quality Management in Construction: Introduction and key concepts - Quality Assurance (QA), Quality Control (QC), and Continuous Improvement, The relationship between quality, cost, and time in project success
- Quality Management Systems (QMS): Overview of Quality Management Systems, Principles of QMS: customer focus, leadership, engagement of people, process approach, The role of documentation and standard operating procedures (SOPs) in quality management
- Quality Planning and Assurance: Defining quality objectives and standards, Developing a quality assurance plan: scope, schedule, and responsibilities, Establishing quality metrics and performance indicators
- Quality Control in Construction: compliance with project specifications, Inspection, testing, and verification processes, Tools and techniques for quality control: checklists, audits, and sampling, Process auditing and monitoring: internal and external audits
- Safety Management in Construction: Legal and regulatory requirements, The role of safety management in reducing accidents, hazard identification and mitigation, Safety Planning and Procedures
- Safety Management Systems (SMS): Overview of Safety Management Systems: principles and components, Roles and responsibilities in safety management- employer, contractor, workers, Safety policies and procedures in the construction environment
- Safety Planning and Procedures: Creating a site-specific safety plan, Emergency procedures and response plans- fire, medical emergencies, evacuation protocols, Personal Protective Equipment (PPE) requirements and management
- Safety audits, inspections, safety and quality culture
- Case Studies and Best practices in implementing quality and safety management systems

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-C 303 Managerial Decision Making

Course Title	Managerial Decision Making					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 303	3	3	50	50	--	100

Objectives:

- To provide students with a comprehensive understanding of the theories, models, and tools used in decision making within the context of construction management.
- To emphasise both analytical and interpersonal skills required for making effective decisions at various stages of a construction project.

Course Contents:

- Management Decision Making: The role of decision making in construction management, Types of decisions: strategic, tactical, and operational, Decision Making Models and Approaches, Tools for Decision Making.
- Problem Identification and Analysis: Techniques for identifying problems and opportunities in construction projects, Root cause analysis and tools like the 5 Whys and Fishbone diagrams,
- Risk Assessment and Decision Making: Types of Risks: financial, technical, safety, and operational risks, Tools for risk assessment: Risk Matrix, Monte Carlo Simulation, sensitivity analysis,
- Group Decision Making and Team Dynamics
- The role of teams in construction management decision making: Decision-making techniques: brainstorming, consensus, Delphi method, Managing group dynamics: conflict resolution and leadership, Leveraging diverse perspectives for better decision outcomes
- Decision Making in Resource Allocation and Scheduling: Resource leveling and smoothing techniques, Making decisions on material procurement, labour allocation, and equipment usage
- Ethical Decision Making in Construction: Understanding ethical issues in construction management, Balancing profit motives with ethical responsibilities, Corporate social responsibility and sustainability in decision making
- The role of technology in modern construction decision making (e.g., BIM, AI, project management software), Using data analytics to inform decisions: trends, forecasts, and predictive models, Big data and its application in improving construction decision making

Sessional Work:
Assignments, Case Studies, Report, Group Projects and Presentations.

PM-C 304 Research Methods - 2

Course Title	Research Methods - 2					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-C 304	2	2	--	100	--	100

Objectives:
The course shall enable the students to acquire their own research interest, to frame their thesis topics, and formulate research proposals for minor and major research. It will also enable them to conduct minor projects, write reports and present them.

Course Contents

- Advance Research Methods
- Big Data Sourcing
- Formulating Research Proposal and Research Design
- Conducting and presenting a minor research project
- Writing Project Report

The course explores the advance principles, methods and process of research. It also explores the recent technique of Big Data sourcing and its application in framing the research questions.

Sessional Work for internal evaluation:

The individual colleges will detail the exercises based on, but not restricted to the following pointers:

- Conducting a minor research project and writing project report
- Seminar
- Research Proposal for Thesis

PM-E 305 Choice Based Elective - 4

Course Title	Choice Based Elective - 4					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-E 305	2	2	--	100	--	100

Course Contents:
Individual colleges will offer electives from which the student would choose as per their own interest. The colleges should design and develop the topics, objectives and contents of choice based elective courses based on their vision and strength. Sessional work for internal evaluation should be carried out in accordance with the course contents. Suggested exercises could be in the form of case study presentations, project work, essays, debates, seminar, quizzes or class tests.

PM-S 306 Construction Management Studio

Course Title	Construction Management Studio					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-S 306	8	5	--	300	--	300

Objectives:

To provide an opportunity for students to apply theoretical knowledge in a practical, real-world context, demonstrating their proficiency in the key elements of construction project management.

Course Contents:

The studio exercise can simulate a real-world construction project, allowing students to demonstrate their understanding and application of key elements of construction project management. This could be done as group work if the individual college desires. Students can be asked to choose a construction project scenario produce necessary work to manage a hypothetical construction project from initiation through completion, addressing issues such as planning, scheduling, budgeting, quality, safety, and risk management, using industry-standard construction management practices, tools, and techniques.

Sessional Work:

The exercise will involve the following:

-Project description, scope statement, and WBS

-Gantt chart, project schedule, and resource allocation plan

-Project budget and cost estimation report

-Risk management and safety plans

-Quality assurance plan and inspection reports

-Regular project status updates and final project reports

-Tools: Students will use construction management software and manual methods (spreadsheets, diagrams) to model their plans and track project performance.

PM-S 307 Advanced Contracts, Tendering and Public Procurement

Course Title	Advanced Contracts, Tendering and Public Procurement					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-S 307	6	3	--	200	--	200

Objectives:

To provide an opportunity for students to apply theoretical knowledge in a practical, real-world context, demonstrating their proficiency in the key elements of contract management and tendering process.

Course Contents:

This studio exercise will supplementary to PM-S 306, and the same studio exercise will be taken up for implementation of contract management and tendering.

Sessional Work:

Preparing a tender package for the construction project, including scope of work, technical specifications, and terms and conditions. Students will prepare the major components of a construction contract, including the scope of work, project schedule, payment terms, and warranties. key clauses like penalties, liquidated damages, dispute resolution, and force majeure.

SEMESTER - IV

	SEMESTER IV Exam Conducted by the University					
Course Code	**Course Name**	**Teaching Scheme (HRS)**				
		L	T	S	TOTAL	CREDITS
PM-E 401	Choice Based Elective - 5	2	--	--	2	2
PM-E 402	Choice Based Elective - 6	2	--	--	2	2
PM-S 403	Dissertation	6	8	12	26	16
		Total/Semester			**30**	**20**

SEMESTER IV Exam Conducted by the University					
Course Code	**Course Name**	**Examination Scheme**			
		Theory Paper	Internal	External Viva	Total Marks
PM-E 401	Choice Based Elective - 5	50	50	--	100
PM-E 402	Choice Based Elective - 6	50	50	--	100
PM-S 403	Dissertation	--	400	400	800
				TOTAL	**1000**

PM-E 401 Choice Based Elective - 5

Course Title	Choice Based Elective - 5					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-E 401	2	2	--	100	--	100

Course Contents:

Individual colleges will offer electives from which the student would choose as per their own interest. The colleges should design and develop the topics, objectives and contents of choice based elective courses based on their vision and strength. Sessional work for internal evaluation should be carried out in accordance with the course contents. Suggested exercises could be in the form of case study presentations, project work, essays, debates, seminar, quizzes or class tests.

PM-E 402 Choice Based Elective - 6

Course Title	Choice Based Elective - 6					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-E 402	2	2	--	100	--	100

Course Contents:

Individual colleges will offer electives from which the student would choose as per their own interest. The colleges should design and develop the topics, objectives and contents of choice based elective courses based on their vision and strength. Sessional work for internal evaluation should be carried out in accordance with the course contents. Suggested exercises could be in the form of case study presentations, project work, essays, debates, seminar, quizzes or class tests.

PM-S 403 Dissertation

Course Title	Dissertation					
			Marks			
Course Code	Hrs/week	Credits	Theory	Internal	External	Total
PM-S 403	26	16	--	400	400	800

Objectives and course contents:

The Final Dissertation in Construction Project Management provides students with an opportunity to conduct independent research on a construction management-related topic of their choice. The dissertation is designed to develop students' research skills, enhance their understanding of key concepts in construction project management, and allow them to critically analyze real-world issues faced in the construction industry. The topics for research can be selected from various aspects of Project Management in such a way that it contributes to the academic and professional discourse in construction project management.

Sessional Work:

A dissertation report (Black Book) that communicates topic selection, objectives, problem identification, research design, literature review, data collection and analysis, research findings, conclusions and bibliography. It should be a clearly and systematically written report with due citations and references.

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