



SYLLABUS FOR COMPUTER SCIENCE WITH HONOURS WITH RESEARCH

SEM. VIII

**4th Year [Four Year Under Graduate Program with Honours
with Research] (FYUGPHWRS)**

Under Single Major Single Minor

(To be implemented from Session 2023-24)

SYLLABUS FOR COMPUTER SCIENCE WITH HONOURS WITH RESEARCH

Proposed Syllabus for four years B.C.A (Major) Programme							
Year	Semester	Paper Code	Paper	Credits	Periods/Week	Exam. Marks	Total Marks
4th Year	VIII	UCMSMAJ48020	RESEARCH METHODOLOGY	4	4		
		IARD	MAJOR RESEACRH PROJECT / DISSERTATION	12	12		

NOTE: Tutorials should involve problem solving session/activity related to the subject taught.

SYLLABUS FOR COMPUTER SCIENCE WITH HONOURS WITH RESEARCH

Discipline: Science ☒ Arts, Humanities & Social Science ☐

Commerce ☐ BBA ☐ BCA ☐

Subject Name:

COMPUTER SCIENCE

Subject Code:

UCMSMAJ48020

(Will be provided by the University)

Semester:

Semester I ☐ Semester II ☐ Semester III ☐ Semester IV ☐

Semester V ☐ Semester VI ☐ Semester VII ☐ Semester VIII ☒

Course Name:

RESEARCH METHODOLOGY

Course Code:

(Will be provided by the University)

Course Credit:

Theoretical

4

Practical/Tutorial

Marks Allotted:

Theoretical

Practical/Tutorial

Continuing Evaluation

Attendance

Course Type (tick the correct alternatives):

Major Core

☒

AEC

☐

Interdisciplinary/ DSE

☐

SEC

☐

Minor / Generic Elective

☐

VAC

☐

Research Project/Dissertation

☐

Vocational

☐

Is the course focused on employability / entrepreneurship?

YES ☒ NO ☐

Is the course focused on imparting life skill?

YES ☒ NO ☐

Is the course based on Activity ?

YES ☒ NO ☐

Remarks by Chairman, UG BOS, if any

UG BOS Meeting Reference Number:

Date:

Course Code: **UCMSMA48020**

Course Name: **RESEARCH METHODOLOGY**

Brief Course Description

The Research Methodology course introduces students to the principles, methods, and techniques of scientific research. It covers the process of identifying research problems, formulating objectives and hypotheses, conducting literature reviews, collecting and analyzing data, and preparing research reports. The course emphasizes ethical research practices and equips students with the knowledge required to undertake academic, scientific, and industry-oriented research projects.

Prerequisite(s) and/or Note(s)

Students should have a basic understanding of their subject area and fundamental analytical skills. Familiarity with data interpretation, academic writing, and computer applications is desirable. The course may include practical exercises involving literature surveys, research proposal preparation, data analysis, and report writing to provide hands-on research experience.

Course Objectives

The course aims to develop an understanding of research concepts, methodologies, and ethical practices. It seeks to equip students with the ability to identify research problems, formulate research questions, design appropriate methodologies, collect and analyze data, and communicate research findings effectively through professional reports and presentations.

Course Outcomes

Upon successful completion of the course, students will be able to formulate research problems, conduct comprehensive literature reviews, select suitable research designs, apply qualitative and quantitative research methods, analyze data using appropriate techniques, and prepare well-structured research reports in accordance with academic and professional standards.

Knowledge Acquired

Students acquire knowledge of research philosophies, research designs, sampling techniques, data collection methods, statistical and analytical tools, hypothesis testing, research ethics, and scientific documentation. They also gain an understanding of the complete research process from problem identification to dissemination of findings.

Skills Gained

The course enhances research, analytical, critical thinking, problem-solving, data collection, data analysis, academic writing, and presentation skills. Students learn to use research tools and techniques effectively, evaluate information critically, and interpret findings for evidence-based decision-making.

Competency Developed

Students develop the competency to independently conduct systematic and ethical research, analyze complex problems using scientific methods, generate meaningful insights from data, and communicate research outcomes effectively. These competencies prepare them for higher studies, professional research careers, innovation, and evidence-based decision-making in academic and industry settings.

Detailed Syllabus**4th Year: Semester 8****UCMSMA48020****RESEARCH METHODOLOGY****[Credits : 4]****UNIT-1 Introduction to Research****(7 Lectures)**

Concept of research, definition, characteristics of good research, Application of Research, Meaning and sources of Research problem, characteristics of good Research problem, Research process, outcomes, application of Research, Meaning and types of Research hypothesis, Review of Literature, importance of Review of Literature.

UNIT-2 Types of Research**(10 Lectures)**

Motivation and objectives – Research methods vs Methodology. Research Design- meaning, need, types of research design, features of good Research design, Experiments, surveys and case study. Types of research – Descriptive and Analytical, Applied and Fundamental, Quantitative and Qualitative, Conceptual and Empirical, concept of applied and basic research process, Criteria of good research.

UNIT-3 Sampling, Data Collection and analysis**(10 Lectures)**

Types and sources of data – Primary and secondary, Methods of collecting data, Concept of sampling and sampling methods – sampling frame, sample, characteristics of good sample, simple random sampling, purposive sampling, convenience sampling, snowball sampling, classification and tabulation of data, graphical representation of data, graphs and charts – Histograms, frequency polygon and frequency curves, bell shaped curve and its properties. Statistical Methods for Data Analysis: statically package (SPSS for student t-test, ANOVA, etc.), hypothesis testing.

UNIT-4 Research Report**(6 Lectures)**

Research report and its structure, journal articles – Components of journal article. Explanation of various components. Structure of an abstract and keywords, components and structure of thesis and dissertations. Referencing styles and bibliography.

UNIT-5 Ethics in Research**(5 Lectures)**

Plagiarism - Definition, different forms, consequences, unintentional plagiarism, copyright infringement, collaborative work, Intellectual property right (IPR) and patent law, Qualities of good Researcher.

UNIT-6 ICT Tools for Research**(7 Lectures)**

Role of computers/ITC in research, maintenance of data using software such as Mendeley, Zotero, Endnote, Overleaf, Tabulation and graphical presentation of research data and software tools. Web search : Use of Internet, using search engines and advanced search tools.

Suggested Readings:

- 1 Kothari C. R, Research Methodology
2. Donald Cooper & PS Schindler(2009)Business Research Methods, 9th edition, Tata McGraw Hill.
3. Uma Sekaran (2010) Research Methods for Business, 4th edition, Wiley.
- 4 Ranjit Kumar (2009) Research Methodology, 2nd edition, Pearson Education
- 5 Naresh Malhotra and S Dash (2009) Marketing Research, 5th edition, Pearson Prentice Hall.
- 6 Michael V. P, Research Methodology.
- 7 Fred N. Kerlinger : Foundations of Behavioral Research.

SYLLABUS FOR COMPUTER SCIENCE WITH HONOURS WITH RESEARCH

Discipline:	Science ☒	Arts, Humanities & Social Science ☐
	Commerce ☐	BBA ☐ BCA ☐
Subject Name:	COMPUTER SCIENCE	
Subject Code:	IARD	(Will be provided by the University)
Semester:	Semester I ☐ Semester II ☐ Semester III ☐ Semester IV ☐ Semester V ☐ Semester VI ☐ Semester VII ☐ Semester VIII ☒	
Course Name:	MAJOR RESEACRH PROJECT / DISSERTATION	
Course Code:		(Will be provided by the University)
Course Credit:	Theoretical 12	Practical/Tutorial
Marks Allotted:	Theoretical	Practical/Tutorial
	Continuing Evaluation	Attendance
Course Type (tick the correct alternatives):		
Major Core	☒	AEC ☐
Interdisciplinary/ DSE	☐	SEC ☐
Minor / Generic Elective	☐	VAC ☐
Research Project/Dissertation	☐	Vocational ☐
Is the course focused on employability / entrepreneurship? YES ☒ NO ☐		
Is the course focused on imparting life skill? YES ☒ NO ☐		
Is the course based on Activity ? YES ☒ NO ☐		
Remarks by Chairman, UG BOS, if any		
UG BOS Meeting Reference Number:		Date:

Course Code: **IARD**

Course Name: **MAJOR RESEACRH PROJECT / DISSERTATION**

Brief Course Description

The IARD Major Research Project / Research Dissertation is a capstone research course designed to provide students with an opportunity to undertake an extensive, independent, and original investigation in a chosen area of study. The course integrates theoretical knowledge, research methodology, and practical application to address significant academic, scientific, technological, social, or industry-related problems. Students are expected to conduct systematic research, analyze findings, and prepare a comprehensive dissertation demonstrating scholarly rigor and innovative thinking.

Prerequisite(s) and/or Note(s)

Students should have successfully completed the required coursework, including research methodology and discipline-specific core subjects. The research topic must be approved by the department and carried out under the guidance of a designated supervisor. Students are required to conduct a literature review, develop a research proposal, collect and analyze data, maintain regular progress reports, and submit a dissertation along with a final presentation and viva voce examination.

Course Objectives The course aims to develop advanced research capabilities by enabling students to identify research gaps, formulate research questions, design and implement appropriate methodologies, and generate meaningful solutions or findings. It seeks to promote independent learning, critical inquiry, innovation, and the application of theoretical knowledge to address real-world challenges through systematic investigation.

Course Outcomes Upon successful completion of the course, students will be able to independently conduct scholarly research, critically evaluate existing literature, apply appropriate research methods and analytical tools, interpret research findings, and produce a well-structured dissertation. They will also be able to communicate research outcomes effectively through professional reports, presentations, and academic discussions.

Knowledge Acquired Students acquire advanced knowledge of research design, data collection techniques, statistical and qualitative analysis methods, scientific writing, research ethics, and domain-specific concepts related to their chosen area of study. They gain a comprehensive understanding of the complete research lifecycle, from problem identification and hypothesis formulation to validation, interpretation, and dissemination of results.

Skills Gained The course strengthens research, analytical, critical thinking, problem-solving, technical writing, data analysis, project management, and presentation skills. Students learn to use modern research tools, software applications, databases, and analytical techniques while developing the ability to work independently and manage complex research tasks effectively.

Competency Developed Students develop the competency to undertake independent and original research, evaluate complex problems using scientific and evidence-based approaches, generate innovative solutions, and communicate research contributions professionally. The course prepares graduates for higher education, doctoral studies, research and development activities, policy formulation, consultancy, entrepreneurship, and leadership roles in academia, industry, and society.

Detailed Syllabus

4th Year: Semester 8

IARD

MAJOR RESEACRH PROJECT / DISSERTATION

[Credits: 12]

MAJOR RESEACRH PROJECT / DISSERTATION GUIDELINES**1. General Rules and Eligibility**

1.1 This project work is compulsory for all students enrolled in the final year of the B.Sc. Computer Science program.

1.2 A student must have cleared all previous semester examinations (or be appearing for no more than two backlogs) to be eligible for project registration.

1.3 Project work carries a total of **12 credits** and is equivalent to the academic engagement over one full semester.

1.4 Each student shall undertake exactly one project. Group projects are permitted only with prior written approval from the Head of Department, with a maximum team size of three students.

1.5 The topic must be submitted for approval within the first two weeks of the semester. No topic changes shall be permitted after the fourth week.

2. Topic Selection and Approval

2.1 Topics must fall within the domain of Computer Science or allied fields (e.g., Artificial Intelligence, Data Science, Cybersecurity, Web Development, Mobile Computing, IoT, Cloud Computing).

2.2 Pure survey or review projects are not permitted unless accompanied by a substantial implementation or comparative analysis component.

2.3 Each student must submit a **Project Synopsis (maximum 3 pages) containing:**

2.3.1 Problem statement and motivation

2.3.2 Clear objectives (minimum three)

2.3.3 Proposed methodology and tools

2.3.4 Expected outcomes and deliverables

2.3.5 Timeline with week-wise milestones

2.4 The Departmental Project Committee shall evaluate and approve or reject the synopsis within five working days.

2.5 Once approved, the topic and scope shall be treated as final. Any modification requires a formal written request and re-approval.

3. Supervision and Monitoring

3.1 Every student shall be assigned a faculty supervisor by the Department.

3.2 A minimum of one formal meeting per week with the supervisor is mandatory. Attendance shall be recorded in a Project Log Book.

3.3 The Log Book must contain:

3.3.1 Date and duration of each meeting

3.3.3 Work completed since the last meeting

3.3.4 Work planned for the next meeting

3.3.5 Supervisor's signature and remarks

3.4 A Mid-Term Review shall be conducted by an internal panel in the eighth week of the semester.

3.5 Students failing the Mid-Term Review (less than 50% progress) shall be placed under academic probation and must resubmit within two weeks.

4. Documentation and Report Standards

4.1 The final project report must be prepared using LaTeX and compiled to PDF.

4.2 The report shall follow the standard chapter structure:

4.2.1 Title Page

4.2.2 Certificate of Originality (signed by student and supervisor)

4.2.3 Abstract (150–300 words)

4.2.4 Table of Contents, List of Figures, List of Tables

4.2.5 Chapter 1: Introduction

4.2.6 Chapter 2: Literature Review

4.2.7 Chapter 3: System Design and Methodology

4.2.8 Chapter 4: Implementation

4.2.9 Chapter 5: Testing, Results, and Evaluation

4.2.10 Chapter 6: Conclusion and Future Scope

4.2.11 References / Bibliography

4.2.12 Appendices (if any)

4.3 Formatting specifications:

4.3.1 Font: Computer Modern or Times New Roman, 12 pt

4.3.2 Line spacing: 1.5 lines

4.3.3 Margins: 2.5 cm on left side and 1.5 on all sides

4.3.4 Heading should be in Bold, max size should not exceed 14 pt

4.3.5 Page size: A4

4.3.6 Citation style: IEEE or ACM format

4.3.7 All figures and tables must be numbered, captioned, and referenced in the text

4.4 The report must be submitted in the following manner:

4.4.1 Two hardbound copies (black cover, golden lettering) to the Department

4.4.2 One soft copy (PDF)

5. Plagiarism and Academic Integrity

5.1 The final report must be submitted to the institutional plagiarism detection tool (e.g., *Turnitin, iThenticate, Drillbit*).

5.2 The maximum permissible similarity index is 15% for the entire report and 7% from any single source.

5.3 Code plagiarism is strictly prohibited. The source code shall be checked using automated plagiarism detection tools.

5.4 Any violation of academic integrity shall result in:

5.4.1 First offense: Zero marks for the project; mandatory resubmission in the next academic term

5.4.2 Second offense: Cancellation of the project and disciplinary action by the Academic Council

6. Submission Deadlines

6.1 Synopsis Submission: Week 2 of the semester

6.2 Mid-Term Report: Week 8 of the semester

6.3 Final Report Submission: Week 16 of the semester (strict deadline)

6.4 Late submissions shall attract a penalty of 10% of total marks per day of delay, up to a maximum of five days. Submissions beyond five days shall not be accepted.

7. Evaluation and Assessment

7.1 The project shall be evaluated out of a total of [100 / 200 / 500] marks, distributed as follows:

7.1.1 Mid-Term Review: 20%

7.1.2 Final Report (Documentation): 30%

7.1.3 Implementation and Code Quality: 25%

7.1.4 Final Viva-Voce and Presentation: 25%

7.2 The Final Viva-Voce shall be conducted by a panel comprising:

7.2.1 Internal Supervisor

7.2.2 One Internal Examiner (other than supervisor)

7.2.3 One External Examiner (from academia or industry)

7.3 The presentation shall be 15–20 minutes followed by a 10–15 minute question-and-answer session.

7.4 A live demonstration of the working system is mandatory during the viva.

7.5 To pass, a student must secure a minimum of 40% in each component and 50% in aggregate.

8. Deliverables Checklist

8.1 At the time of final submission, the student must provide:

8.1.1 Final Project Report (2 hardbound and soft copy)

8.1.2 Plagiarism Report (original and within limit)

8.1.3 Source Code (with README and setup instructions)

8.1.4 Presentation Slides (PPT/PDF)

8.1.5 Demonstration Video (5–10 minutes, optional but recommended)

9. Code and Repository Standards

9.1 Source code must be well-commented and follow consistent naming conventions.

9.2 A README.md file must include:

9.2.1 Project title and brief description

9.2.2 Technology stack and dependencies

9.2.3 Installation and execution instructions

9.2.4 Screenshots or demo links

9.2.5 Contribution notes (if group project)

9.3 If the project involves a database, a schema diagram and sample dataset must be included.

9.4 All third-party libraries, APIs, or datasets used must be properly attributed.

10. General Conduct

10.1 Students must maintain professional conduct during all project-related activities.

10.2 Any dispute between group members must be reported to the supervisor and HoD in writing within 48 hours.

10.3 The Department reserves the right to reallocate topics or supervisors under exceptional circumstances.

10.4 All decisions of the Departmental Project Committee shall be final and binding.