Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari College of Computer Application
Semester-7 (BCA)

**Subject:** Research Project – BCAXX17410

**Type of course:** Research Project (RP)

**Prerequisite:** Students should possess fundamental knowledge of Programming Fundamentals, Database Management Systems, Software Engineering, Research Methodology, Data Analysis, Web Technologies, Emerging Technologies, and Professional Communication.

## Rationale:

Research Project provides students with an opportunity to investigate real-world problems through systematic study, analysis, experimentation, and solution development. The course encourages innovation, critical thinking, analytical skills, and independent learning. Students apply knowledge acquired throughout the BCA program to identify research problems, conduct literature reviews, design methodologies, develop prototypes or models, analyze results, and communicate findings through technical reports and presentations.

The course prepares students for higher studies, industry research assignments, product innovation, entrepreneurship, and technology-driven problem solving.

## Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|---|
| | | | | SEE | | CCE | | | |
| CI | T | P | C | Theory | Practical | MSE | V | ALA | |
| 0 | 0 | 12 | 6 | 00 | 80 | 00 | 20 | 00 | 100 |

***Legends:*** *CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.*

## Course Outcome:

| After learning the course the students should be able to: | |
|---|---|
| CO1 | Identify, formulate, and justify a well-defined research problem in the field of Computer Applications. |

| | |
|---|---|
| CO2 | Conduct literature surveys and critically analyze existing research work to identify research gaps and opportunities. |
| CO3 | Design and apply appropriate research methodologies, tools, and techniques for problem investigation and solution development. |
| CO4 | Develop and implement a functional prototype. using appropriate technologies, and evaluate it using defined metrics (accuracy, performance, usability, security, etc.). |
| CO5 | Prepare professional research documentation, technical reports, and presentations while demonstrating analytical thinking, innovation, ethical practices, and effective communication skills. |

## Evaluation Parameter

Total Marks (100 = 80 External + 20 Internal)

## Internal Assessment (20 Marks)

| Parameters | Marks |
|---|---|
| Problem Identification & Synopsis | 10 |
| Progress Review by Faculty Guide | 10 |
| **Total** | **20** |

## External Assessment (80 Marks)

| Parameters | Marks |
|---|---|
| Research Problem Identification & Justification | 15 |
| Literature Review & Research Gap Analysis | 20 |
| Research Methodology & Design | 20 |
| Prototype Development & Evaluation | 25 |
| Documentation, Presentation & Viva Voce | 20 |
| **Total** | **80** |

## Guidelines

### Research Areas

Projects may be undertaken in:

**AI & Machine Learning:**

- Generative AI
- Computer Vision
- NLP applications
- Ethical AI.

**Data Science & Big Data:**

- Real-time analytics
- Data visualization dashboards.

**Cyber Security & Privacy:**

- Blockchain for security
- Zero-trust architecture
- Privacy-preserving ML.

**Cloud & DevOps:**

- Serverless computing
- Container orchestration(Docker/Kubernetes)
- Edge computing.

**Mobile & IoT:**

- Cross-platform development (Flutter/React Native)
- IoT security
- Smart systems.

**Web Technology**

- Progressive Web Apps (PWA)
- Web3, Microservices.

**Emerging:**

- Sustainable/Green Computing
- AR/VR applications
- Quantum
- computing basics/applications
- Human-Computer Interaction (HCI).

**Duration**

- Minimum: 180 Hours
- Maximum: 240 Hours

**Mentorship**

Each student shall be assigned:

- Research Guide (Faculty)
- Co-Guide (Optional)
- Industry Mentor (Optional)

The mentors shall monitor progress periodically.

## Research Ethics & Academic Integrity

- All research work must comply with ethical standards and academic integrity principles.
- Students shall ensure originality in research work and avoid plagiarism.

- Maximum permissible plagiarism similarity index: 15% (excluding references and quotations).
- Students must submit a Declaration of Originality along with the final report.
- Data privacy, confidentiality, and applicable legal requirements (IT Act/GDPR where applicable) must be followed.
- Use of AI tools (ChatGPT, Copilot, etc.) is permitted only for coding assistance, literature summarization, and productivity enhancement with proper acknowledgement.

## Project Timeline & Milestones

| Phase | Duration |
|---|---|
| Problem Identification & Synopsis Approval | Weeks 1–2 |
| Literature Review | Weeks 3–5 |
| Research Methodology & Design | Weeks 6–8 |
| Development & Testing | Weeks 9–11 |
| Analysis & Report Writing | Weeks 12–15 |
| Final Presentation & Viva | After 15 week |

## Student Deliverables

## Mandatory Deliverables

1. Research Synopsis
2. Weekly Digital Logbook
3. Literature Survey Matrix
4. Mid-Term Progress Presentation
5. Prototype / Model / Software Application
6. Source Code Repository
7. Final Research Project Report
8. Final Presentation (15–20 Minutes)
9. Project Demonstration
10. Plagiarism Report
11. Deployment Link / APK / Docker Image (where applicable)

## 1. Weekly Work Diary / Log Book

The log book shall include:

- Date
- Hours Worked
- Activity Performed
- Literature Reviewed
- Research Findings
- Development Progress
- Challenges Faced
- Guide Remarks

## 2. Research Project Report

The final research project report is a comprehensive, professional document that demonstrates the student's ability to conduct systematic research and communicate findings effectively. The report must be 25-50 pages (excluding annexures), typed in Times New Roman, 12 pt font, 1.5 line spacing, with 1-inch margins on all sides. Use APA 7th edition or IEEE referencing style (consistent throughout). Students are Strongly encouraged to use LaTeX/Overleaf for better formatting of technical content, Equations, and figures.

1. Title Page
2. Certificate (Guide & HoD)
3. Declaration
4. Acknowledgement
5. Abstract (150–250 words)
6. Keywords (5–8)
7. Table of Contents
8. List of Figures
9. List of Tables
10. List of Abbreviations

**Main Body**

**1. Introduction**

- Background of Study
- Problem Statement (clear, concise, justified)

- Research Objectives (primary + secondary, SMART)
- Scope and Limitations of the Study
- Significance of the Research

**2. Literature Review**

- Review of existing research (minimum 15–20 relevant sources)
- Comparative Analysis (in tabular/matrix form)
- Identification of Research Gap(s)

**3. Research Methodology**

- Proposed Methodology (qualitative/quantitative/mixed, design type)
- Tools and Technologies (with justification)
- Data Collection Methods
- Experimental Design / Algorithm / Framework
- Ethical Considerations

**4. System Design & Development**

- System Architecture (diagrams: UML, ER, etc.)
- Database Design (schema, normalization)
- Module Design & Implementation Details
- Prototype / Application Development Process

**5. Results & Analysis**

- Implementation Results & Screenshots
- Data Analysis & Visualization
- Testing (Unit, Integration, System, User Acceptance)
- Performance Evaluation (metrics: accuracy, efficiency, scalability, usability,security)
- Comparative Results (with existing systems)

**6. Conclusion & Future Scope**

- Summary of Findings
- Limitations
- Future Enhancements & Recommendations

**References** (minimum 20–30 sources, properly cited)

**Annexures / Appendices:**

- Plagiarism Report
- Any additional supporting material
- Additional Documentation Requirements
- Plagiarism Limit: Maximum 15% similarity (excluding quotes & references).
- Must attach Turnitin/Urkund report.
- Figures & Tables: Properly numbered, captioned, and referred to in text.
- Code Submission: Full source code



- Deployment (if applicable): Live demo link or APK / Docker image.
- Formatting Checklist: Header with project title & page number; consistent headings (Heading 1, 2, etc.).