Jalna College of I.T., Jalna

Affiliated to Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

Program and Course Outcomes (POs & COs) and Attainment Evaluation

Introduction

Jalna College of I.T., Jalna offers **BCA, BA, BSc, B.Sc. Networking & Multimedia, and B.Sc. Home Science** programs. The institution is committed to **integrating Program Outcomes (POs), Program Specific Outcomes (PSOs), and Course Outcomes (COs)** into the curriculum, ensuring that students acquire comprehensive knowledge, professional skills, and ethical values.

The outcomes are:

- Clearly defined for every program and course.
- Publicized through the **college website, prospectus, course handbooks, and departmental notice boards**.
- Continuously monitored and assessed through **direct and indirect evaluation methods**.
- Mapped to **graduate attributes**, ensuring holistic development.

A. Integration of Program Outcomes and Course Outcomes into Curriculum

1. **Program Outcomes (POs)** define the broad competencies expected of a graduate, such as critical thinking, professional skills, ethical behavior, communication, and lifelong learning.
2. **Course Outcomes (COs)** are specific learning objectives for individual subjects, reflecting knowledge, skills, and attitudes gained by the student upon completion of the course.
3. The curriculum is **designed in a progressive manner**, ensuring that foundational knowledge is established in early semesters and advanced skills are developed in later semesters.
4. **POs and COs are mapped** to assessment methods, projects, internships, and co-curricular activities.

B. Program-wise Detailed POs and COs

1. BCA (Bachelor of Computer Applications)

Program Outcomes (POs):

- **PO1:** Demonstrate a strong foundation in computational theory, programming, and algorithms to solve complex problems.
- **PO2:** Apply software development principles, database management, networking, and security concepts effectively.
- **PO3:** Exhibit professional ethics, teamwork, and effective communication in software projects and IT-related tasks.
- **PO4:** Analyze and evaluate new technologies to adapt them to real-world computing challenges.
- **PO5:** Engage in lifelong learning and research to stay updated with the rapidly evolving IT industry.

Course Outcomes (COs):

Course	Course Outcomes (COs)
Programming Fundamentals	Develop problem-solving skills using structured programming; write efficient programs.
Database Management Systems	Design, implement, and query relational databases to meet user requirements.
Web Technologies	Create dynamic web applications using front-end and back-end tools.
Software Engineering	Analyze requirements, design software solutions, and work in teams for project development.
Operating Systems	Understand process management, memory management, and file systems.

Attainment Evaluation:

- Internal assessments: quizzes, assignments, practical labs, and mini-projects.
- External assessments: semester-end examinations, project presentations.
- Mapping of COs to POs through a **PO-CO matrix**, with levels of attainment (High/Medium/Low).
- Regular feedback from students and employers for continuous improvement.

Program and Course Outcomes (POs & COs) and Attainment Evaluation Report

Institution:	**Jalna College of I.T., Jalna**
Affiliation:	Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar
Prepared by:	Internal Quality Assurance Cell (IQAC) & Departmental Outcome Assessment Teams
Report Focus:	Outcome-Based Education (OBE) Implementation and Attainment Evaluation

Introduction to Outcome-Based Education (OBE) Framework

1.1 Institutional Commitment and Vision

Jalna College of I.T., Jalna, adopts the **Outcome-Based Education (OBE)** model as a cornerstone of its pedagogical approach. This model shifts the focus from what is taught to **what students can do** after completing a program or course. The institution's commitment to OBE ensures graduates acquire comprehensive **knowledge, professional skills, and ethical values**, making them highly competent and socially responsible.

1.2 Defining and Publicizing Outcomes

The outcomes hierarchy follows a clear structure:

1. **Program Outcomes (POs):** Broad skills and knowledge expected of any graduate of a specific program (e.g., BCA graduate).
2. **Program Specific Outcomes (PSOs):** Discipline-specific competencies that prepare students for careers in their field (e.g., ability to manage networked systems for B.Sc. Networking & Multimedia).
3. **Course Outcomes (COs):** Specific learning objectives achieved upon successful completion of an individual course/subject.

All POs, PSOs, and COs are formally **defined, approved** by academic bodies, and **publicized** across multiple platforms: the college website, annual prospectus, course handbooks, and departmental notice boards, ensuring transparency for all stakeholders (students, faculty, parents, and employers).

1.3 Integration into the Curriculum

The curriculum is meticulously designed with a **progressive structure**. Foundational knowledge (mapped to lower-level COs) is covered in earlier semesters, providing the basis for advanced, application-based skills (mapped to higher-level COs and POs) in later semesters. This linkage is formalized through the **PO-CO mapping matrix**, which guides:

- **Teaching-Learning Methods:** Selection of pedagogy (lectures, labs, flipped classrooms) best suited to achieve the outcome.
- **Assessment Tools:** Designing quizzes, assignments, projects, and exams specifically targeting COs.

- **Experiential Learning:** Integrating POs/PSOs into mandatory **projects and internships**.

Program-wise Detailed Outcomes

The following section presents the established POs and a summary of representative COs for each program, detailing the graduate attributes the institution seeks to cultivate.

2.1 BCA (Bachelor of Computer Applications)

PO No.	Program Outcome (POs)	Graduate Attribute Focus
PO1	Demonstrate a strong foundation in computational theory, programming, and algorithms to solve complex problems.	**Core Knowledge**
PO2	Apply software development principles, database management, networking, and security concepts effectively.	**Application Skills**
PO3	Exhibit professional ethics, teamwork, and effective communication in software projects and IT-related tasks.	**Professionalism & Ethics**
PO4	Analyze and evaluate new technologies to adapt them to real-world computing challenges.	**Innovation & Critical Thinking**
PO5	Engage in lifelong learning and research to stay updated with the rapidly evolving IT industry.	**Lifelong Learning**

Course	Representative Course Outcomes (COs)
Programming Fundamentals	CO1: Develop problem-solving skills using structured programming; CO2: Write efficient, well-documented programs.
Database Management Systems	CO3: Design, implement, and query relational databases to meet user requirements.
Web Technologies	CO4: Create dynamic web applications using front-end (HTML/CSS/JS) and back-end tools.
Software Engineering	CO5: Analyze requirements, design software solutions, and work effectively in teams for project development.
Operating Systems	CO6: Understand process management, memory management, and file systems.

Attainment Evaluation Methodology

The college employs a rigorous and transparent methodology to measure the achievement of defined outcomes.

3.1 Direct Assessment Methods

Direct assessment involves evaluating student performance in assignments and examinations that are mapped directly to specific COs. This forms the quantitative core of the attainment process.

Assessment Tool	Assessment Focus	POs Primarily Targeted
Semester-End Examinations (SEE)	Comprehensive knowledge, conceptual understanding.	PO1, PO2 (Core Knowledge)
Internal Assessments (CIA: Quizzes, Assignments)	Continuous learning, specific CO focus, theoretical application.	PO1, PO5 (Learning & Theory)
Practical Labs & Mini-Projects	Technical skill application, problem-solving, teamwork.	PO2, PO3 (Application & Teamwork)
Major Project Presentations	Solution design, communication, ethics, innovation.	PO2, PO3, PO4 (Holistic Application)

3.2 Indirect Assessment Methods

Indirect methods capture the student's perception of their learning and the application of skills in a professional environment, assessing the broader professional and ethical outcomes.

1. **Student Exit Feedback Surveys:** Assess perceived skill acquisition and confidence levels (Mapping to PO3, PO5).
2. **Alumni Feedback:** Evaluate the relevance of the curriculum to career paths (Mapping to PO4, PO5).
3. **Employer Feedback (Internships):** Measure graduate performance in professional environments, focusing on ethics, communication, and teamwork (Mapping to PO3, PO4).

3.3 Calculation of Attainment Levels

The degree of attainment is calculated using a structured, weighted approach:

A. CO Attainment Target and Scale

The institution sets a definitive target for all COs: **60% of enrolled students must score 60% or above** in the assessment components mapped to that CO.

The final CO Attainment score is calculated using weighted direct assessment components:

$$\text{CO Attainment} = (0.4 \times \text{CIA Score}) + (0.6 \times \text{SEE Score})$$

Attainment Percentage	Attainment Level	Interpretation
≥70%	**High (H)**	Outcome fully achieved; model for best practices.
50%−69%	**Medium (M)**	Outcome largely achieved; minor corrective actions needed.
<50%	**Low (L)**	Outcome not sufficiently achieved; major pedagogical revision required.

B. PO Attainment Calculation

PO Attainment is derived from the average of the CO Attainment scores mapped to it, weighted by the degree of mapping (**H=3, M=2, L=1**).

PO Attainment$_j$=∑Mapping Level$_{i,j}$∑(CO Attainment$_i$×Mapping Level$_{i,j}$)

Case Study: Attainment Evaluation for BCA Program

This chapter illustrates the practical application of the attainment evaluation methodology using the BCA program's core courses.

4.1 PO-CO Mapping Matrix: BCA Core Courses

The following matrix illustrates the correlation between representative Course Outcomes (COs) and the BCA Program Outcomes (POs):

CO	Course	PO1	PO2	PO3	PO4	PO5
CO1	Programming Fundamentals	**H**	M	L	-	L
CO3	Database Management Systems	M	**H**	L	M	-
CO4	Web Technologies	L	**H**	M	**H**	M
CO5	Software Engineering	M	**H**	**H**	M	M
CO6	Operating Systems	**H**	M	-	L	-

Note: H=High (3), M=Medium (2), L=Low (1), - = None (0)

4.2 Model Attainment Results for BCA (Illustrative Data)

Based on the calculation methodology (Chapter 3) using sample data from a typical semester:

CO	Course	Calculated Attainment	Attainment Level
CO1	Programming Fundamentals	73%	**High (H)**
CO3	Database Management Systems	68%	**Medium (M)**
CO4	Web Technologies	79%	**High (H)**
CO5	Software Engineering	58%	**Medium (M)**
CO6	Operating Systems	52%	**Medium (M)**

4.3 Derived PO Attainment Status for BCA

By applying the weighting formula to the above CO Attainment results:

PO No.	BCA Program Outcome	Weighted Attainment Score	Attainment Level
PO1	Computational Theory & Algorithms	70.8%	**High (H)**
PO2	Software Development & Application	69.1%	**Medium (M)**
PO3	Professional Ethics & Communication	59.5%	**Medium (M)**
PO4	New Technology Analysis	71.3%	**High (H)**
PO5	Lifelong Learning & Research	65.0%	**Medium (M)**

Analysis and Continuous Improvement Plan (CIP)

5.1 Attainment Analysis

The BCA program demonstrates strong attainment in **PO1 (Computational Theory)** and **PO4 (New Technology Analysis)**, largely driven by the practical nature of courses like Web Technologies and the continuous updates to the curriculum.

However, **PO2 (Software Development)** and **PO3 (Ethics/Communication)** show a moderate attainment level, indicating areas for focused improvement:

- **PO2 (Medium):** The complexity of larger-scale software development projects (CO5) needs more emphasis.
- **PO3 (Medium):** The moderate score highlights a need to better integrate soft skills (teamwork, communication) and professional ethics into the assessment process.

5.2 Continuous Improvement Plan (CIP)

Based on the attainment data, the IQAC and the BCA Department have established the following corrective measures for the next academic cycle:

Area for Improvement	Attainment Data Driver	Action Plan (CIP)
PO2 & CO5	Medium Attainment in Software Engineering (Project)	Introduce a mandatory **Agile/Scrum module** with dedicated mentorship to enhance team-based project delivery skills.
PO3	Low Attainment in Ethics/Communication	Allocate **20% of internal marks** for project courses to structured documentation, peer review, and ethics reports.
PO3 & PO5	Moderate Lifelong Learning/Ethics	Integrate mandatory **Employer Feedback Forms** into the internship process that specifically grade professional communication and adherence to workplace ethics.