



Haribhai. V. Desai College of Arts, Science & Commerce,
Pune-02

OUTCOME BASED EDUCATION (OBE) MANUAL

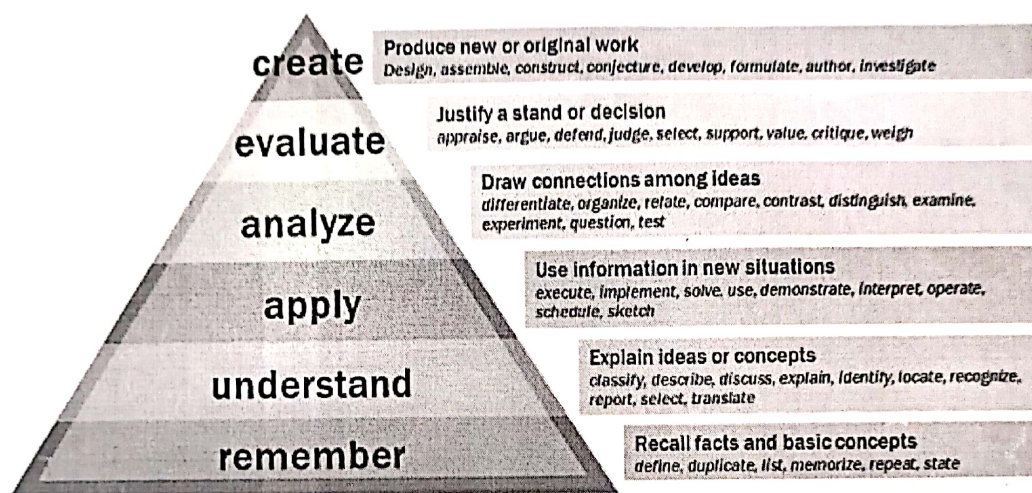
Course Outcome, Program Outcome and
programmed Specific Outcome, Writing, Mapping
and Attainment Procedures

The outcome-based education policy, along with the necessary mechanisms for its implementation, has been established by Haribhai. V. Desai College of Arts, Science & Commerce, Pune.

Course Outcome Writing:

The course outcomes (COs) are formulated in alignment with Bloom's Taxonomy, encompassing six levels of learning. These COs are structured to progress from lower to higher cognitive challenges, adhering to the six steps of Bloom's Taxonomy (Remember, Understand, Apply, Analyze, Evaluate, Create).

Bloom's Taxonomy



- For each course, there are either 4 or 6 course outcomes defined.
- A progression from lower to higher cognitive challenges.
- Action verbs are employed to articulate activities and learning outcomes.
- The course outcomes are clearly delineated and communicated to both teachers and students, informing the development of corresponding strategies.

Programme Outcomes (POs):

- Programme outcomes are drafted based on Graduate Attributes (GA) defined and instructed by UGC, LOCF.
- Learning outcome-based curriculum framework (LOCF) is the basis of writing programme outcomes.
- Graduate attributes and programme outcomes include outcomes related to:
 1. Disciplinary knowledge
 2. Critical thinking skills
 3. Communicative skills to explain discipline specific knowledge
 4. Problem solving skills
 5. ICT skills and digital literacy.

6. Scientific reasoning
7. Multidisciplinary / interdisciplinary skills
8. Research skills
9. Life skills
10. Ethics

- Programme outcomes POs are written according to above skills and are communicated to stakeholders.

Programme Specific Outcomes:

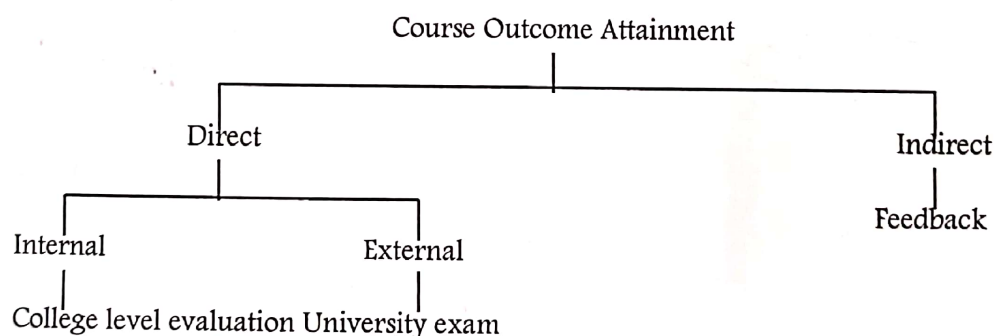
- Programme specific outcomes are drafted based on programme outcomes to specify discipline specific outcomes of the programme.

Co-relation of COs – POs and PSOs:

At every course level COs are co-related and mapped with POs with the following strength:

Low = 1 Moderate = 2 High = 3

- Based on co-relation and mapping, strength of the subject per PO is finalized.
- Every CO is co-related with internal assessment for setting targets and measuring outcome of internal evaluation.
- The process of measuring outcome is followed as follows:



For course outcome calculation:

Direct percentage: 70%

Indirect percentage: 30%

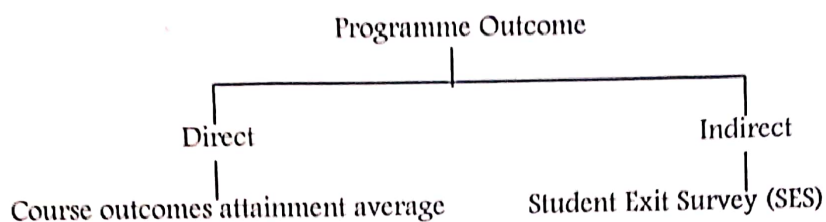
Internal evaluation = 30%

External (University) evaluation: 70%

Programme outcome attainment:

For programme outcome attainment, consideration of the points:

1. Course outcome percentage
2. Mapping strength calculated for every PO and PSO from course outcomes
3. Mapping target (levels)



Procedure followed POs and PSOs Attainment Calculation:

1. Taking average of all COs for each PO and PSO.
2. Taking average of PO wise and PSO wise mapping strength.
3. Formula used to calculate percentage of programme attainment.

PO Attainment = CO average % for the PO × mapping strength / target

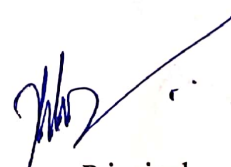
Every PO average percentage per PO and PSO is calculated subjectwise.

Final PO and PSO outcome measurement:

1. Every subject wise / course wise PO attainment percentage received is consider and average of all is consider for every PO and PSO.
2. Policy to calculate PO and PSO: 70% of direct attainment and 30% of student Exit survey indirect attainment.



Programme Co-Ordinator/IQAC Co-Ordinator

Principal
Principal
 Haribhai V Desai College
 (Arts, Science & Commerce)
 Pune-02

PROGRAMME OUTCOME of B.Sc. (Microbiology) 2022-23

1. To impart basic knowledge of the respective subject from all possible angle
2. To train the students to apply this knowledge in day-to-day applications of
3. To get a glimpse of future research in Microbiology
4. To inculcate sense of scientific responsibilities and social and environment
5. To help students to build-up a progressive and successful career.

PO / PSO Attainment Sheet

PO / PSO Attainment Sheet																
Year	Semester	Subject Name / Code	PO1	PO2	PO3	PO4	PO5	PSO.1	PSO.2	PSO.3	PSO.4	PSO.5	PSO.6	PSO.7	PSO.8	
Year-1	SEM 1	MB 112	33.5	40.2	30.2	40.2	30.2	33.5	36.9	30.2	36.9	30.2	30.2	26.8	36.3	
		MB 122	26.9	37	37	37	30.3	30.3	30.3	33.6	40.3	37	33.6	40.3	33.6	
	SEM 2	MB 121	33.2	33.2	33.2	33.2	40.6	33.2	36.9	40.6	25.9	40.6	40.6	40.6	44.3	
		MB 242	297.7	409.5	409.5	409.5	410.1	335.4	372.7	454.8	348	500.8	454.8	545.4	496.2	
		MB 231	51.9	33.4	37.1	33.4	40.8	40.8	44.5	37.1	37.1	40.8	29.7	44.5	37.1	
Year 2	sem 3	MB 232	42.1	37.9	42.1	46.3	37.9	50.5	42.1	42.1	50.5	42.1	46.3	46.3	50.5	
		sem 4	MB 241	42.2	45.7	35.2	28.2	38.7	42.2	38.7	35.2	31.7	35.2	31.7	38.7	35.2
	MB 351		53.7	49.2	44.8	44.8	49.2	49.2	40.3	49.2	49.2	44.8	53.7	44.8	35.8	
	MB 352	42.8	39.2	35.6	39.2	39.2	39.2	39.2	39.2	42.8	35.6	39.2	35.6	35.6		
	sem 5	MB 352	42.8	39.2	35.6	39.2	39.2	39.2	32.7	32.7	35.9	35.9	39.2	35.9	32.7	29.4
		MB-353	39.2	35.9	35.9	35.9	39.2	39.4	35.8	35.8	39.4	43	39.4	35.8	35.8	35.8
		MB 355	46.6	39.4	39.4	39.4	39.4	35.8	35.8	39.4	43	39.4	35.8	35.8	35.8	35.8
		MB 356	35.9	35.9	32.6	32.6	35.9	32.6	29.4	35.9	32.6	35.9	32.6	32.6	32.6	32.6
		MB 361	38.1	50.8	38.1	46.6	42.3	42.3	46.6	46.6	46.6	42.3	42.3	42.3	42.3	38.1
		MB 362	44.4	40.7	40.7	44.4	44.4	40.7	40.7	33.3	37	33.3	33.3	37	33.3	33.3
Year 3	sem 6	MB-363	36.7	44.9	44.9	44.9	44.9	48.9	44.9	40.8	40.8	40.8	40.8	40.8	36.7	
		MB 365	48.6	52.7	40.5	32.4	44.6	48.6	44.6	40.5	36.5	40.5	36.5	44.6	40.5	40.5
		MB 366	36.7	44	36.7	36.7	44	40.4	33	33	36.7	36.7	36.7	40.4	36.7	36.7
PO / PSO wise Average (Direct)			53	60	57	58	59	55	56	60	55	63	59	66	61	
PO Average using Indirect Method			88.24	88.72	87.52	87	85.85	86.57	87.52	88	86	84	81	82	83	
PSO Attainment using 70% of Direct and 30% of Indirect			64	69	67	67	68	65	66	69	65	70	66	71	68	
PO Attainment Targets			60	60	60	60	60	60	60	60	60	60	60	60	60	
Attainment % Gap			4	9	7	7	8	5	6	9	5	10	6	11	8	

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PO-STATEMENTS (B.Sc - Comp. Science)

1. Train students in algorithmic and programming skills
2. Build the necessary skills set for developing computer-based solutions for real life problems.
3. Develop problem solving abilities using a computer
4. Provide Quality software development practices.
5. Create awareness about process and products standard.
6. Train students in professional skills related to the software industry.
7. Prepare necessary knowledge base for research and development in computer science.
8. Help students build-up a successful career in computer science

Program Specific Outcomes:

1. Demonstrate understanding of the principles and working of the hardware and software aspects of computer systems.
2. Design, implement, test and evaluate a computer system, component or algorithm to meet desired needs and to solve computational problems.

PO / PSO Attainment Sheet

Year	Semester	Subject Name / Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
Year-1	SEM 1	CS-111	54.2	54.2	61	45.2	61	61	22.6	45.2	45.2	45.2
		CS-112	43.9	65.9	37.4	33	33	33	22	54.9	43.9	43.9
		MTC-111	29.7	31.9	31.9	21.3	31.9	21.3	38.2	21.3	21.3	29.7
		MTC-112	39.1	48.9	33.3	19.6	19.6	29.4	33.3	45	19.6	45
		ELC-111	21.3	42.6	63.9	42.6	42.6	42.6	21.3	21.3	42.6	42.6
		ELC-112	21.2	42.4	52.9	42.4	42.4	21.2	42.4	21.2	29.7	50.8
		CSST-111	45.9	57.4	23	23	23	45.9	62	45.9	23	45.9
		CSST-112	45.3	56.6	22.7	22.7	22.7	45.3	61.1	45.3	22.7	45.3
		CS-121	31.4	50.3	48.2	52.4	27.3	31.4	31.4	31.4	46.1	46.1
		CS-122	44	65	44	65	44	65	65	44	44	65
		MTC-121	33.7	22.5	22.5	22.5	22.5	22.5	31.5	22.5	22.5	22.5
		MTC-122	50.5	50.5	30.7	22	22	30.7	32.9	39.5	22	39.5
	SEM 2	ELC-121	22.56	45.12	22.56	22.56	45.12	22.56	45.12	45.12	67.68	67.68
		ELC-122	21	41.9	21	21	41.9	21	41.9	41.9	62.8	62.8
		CSST-121	45.3	56.6	22.7	34	34	45.3	61.1	45.3	45.3	45.3
		CSST-122	22.5	22.5	40.4	33.7	22.5	38.1	53.8	56.1	38.1	60.5
		CS-231	62	62	62	31	41.3	51.7	49.6	62	31	62
		CS-232	49.6	39.7	59.5	49.6	27.8	39.7	39.7	47.6	39.7	47.6
	SEM 3	ELC-231	28.3	43.5	43.5	65.3	43.5	43.5	43.5	43.5	65.3	54.4
		ELC-232	32	43	21	21	43	43	43	43	32	21
		MTC-231	93.5	62.3	93.5	62.3	62.3	62.3	62.3	87.3	62.3	93.5
		MTC-232	41.3	41.3	20.7	20.7	20.7	35.1	31	47.5	31	31
		CS-241	63.9	66.6	66.6	26.7	26.7	74.5	66.6	66.6	53.3	79.9
		CS-242	49.9	40	49.9	40	49.9	34	28	40	49.9	36
		ELC-241	21.4	42.8	21.4	42.8	42.8	53.5	21.4	42.8	42.8	64.2

Year 2	sem 4	ELC-242	29	22	43	43	32	43	43	64	64	32
		MTC-241	22.7	28.3	28.3	22.7	22.7	22.7	22.7	22.7	22.7	22.7
		MTC-242	37.9	53	19	19	19	43.6	19	47.3	19	34.1
		CS-351	41.4	20.7	41.4	41.4	41.4	62.1	20.7	20.7	31.1	31.1
		CS-352	21.8	43.6	43.6	32.7	37.1	54.5	21.8	39.3	30.6	37.1
		CS-353	46.7	43.6	43.6	32.7	37.1	54.5	21.8	39.3	30.6	37.1
		CS-354	63.8	21.3	53.2	63.8	42.6	42.6	42.6	42.6	42.6	42.6
		CS-355	44.6	55.7	33.4	33.4	44.6	31.2	44.6	55.7	22.3	44.6
		CS-356	23.1	42.3	38.5	19.3	32.7	28.9	25	26.9	28.9	26.9
		CS-3511	54.9	44	44	22	22	44	44	44	65.9	37.4
	sem 5	CS-3510	41	41	41	20.5	41	41	41	30.8	30.8	30.8
		CS-361	44.5	44.5	44.5	22.3	22.3	44.5	22.3	22.3	37.8	44.5
		CS-362	48	40.8	48	43.2	36	48	36	48	36	48
		cs-363	41.4	41.4	41.4	62	41.4	41.4	31	41.4	20.7	41.4
		CS-364	65.1	21.7	54.2	65.1	43.4	43.4	43.4	43.4	43.4	43.4
		CS-365	43.1	43.1	43.1	43.1	21.6	30.2	21.6	51.7	28	36.6
		cs-366	39.1	48.9	33.3	19.6	19.6	29.4	33.3	45	45	45
		CS-3611	57.1	57.1	57.1	47.6	47.6	61.8	47.6	47.6	42.8	47.6
		CS-3610	33.2	44.2	44.2	44.2	44.2	44.2	44.2	37.6	44.2	33.2
Year 3	sem 6											
PO / PSO wise Average (Direct)			41.18	44.38	41.17	35.91	35.05	41.47	38.1	42.65	38.42	44.63
PO Average using Indirect Method			88.24	88.72	87.52	87	85.85	86.57	87.52	88	86	84
PSO Attainment using 70% of Direct and 30% of Ind			56	58	56	52	51	55	53	57	53	57
PO Attainment Targets			50	50	50	50	50	50	50	50	50	50
Attainment % Gap			6	8	6	2	1	5	3	7	3	7

Program Outcomes (PO)(Environmental Science)

PO1: Enhanced Environmental Literacy: To develop in-depth knowledge and integrate with existing knowledge to sensitize the people about global and local environmental issues.

PO2: Social Interaction- Development of scientific outlook not only with respect to science subjects but also in all aspects related to life. To inculcate a harmonious relationship between nature and human beings.

PO3: Critical Thinking- Cultivate critical thinking skills to effectively recognize, meticulously assess, and devise solutions for environmental challenges, leveraging fundamental tenets of ecological preservation.

PO4: Enhance Technical and Research Skills: cultivate skills by enabling the identification, formulation, and critical analysis of relevant research literature to address contemporary problems in the field.

PO5: Importance and Applications: Demonstrate understanding of the significance and applications of environmental science across academic, industrial, economic, and social spheres.

PO6: Environmental Experts: cultivates transdisciplinary expertise in environmental methodologies, empowering students for diverse environmental science careers.

PO7: Traditional Knowledge: To foster a culture of indigenous traditional knowledge application for sustainable future.

PO8: Environment and Sustainability- Critically analyze the impact of human activities on environmental systems and design solutions through integration of sustainability principles for promoting intergenerational equity and ecological integrity.

PO9: Career Perspectives: Undertake research and on field activities which develop problem solving abilities required for successful career in Environmental Science.

PO10: Development of Skills: Cultivate transferable skills, including effective communication, teamwork, project management, financial literacy and research proficiency encompassing experimental design, data analysis and evidence-based reasoning.

PO / PSO Attainment Sheet

Year	Semester	Subject Name / Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
Year-1	SEM 1	EVSUT-111	60.7	30.4	60.7	50.6	44.5	40.5	40.5	40.5	40.5	60.7	50.6	40.5	48.8
		EVSUT-112	58.4	19.5	33.1	58.4	38.9	52.5	19.5	19.5	38.9	58.4	25.3	58.4	38.9
		EVSUT-113	72.1	24.1	72.1	48.1	48.1	48.1	33.7	48.1	48.1	48.1	72.1	72.1	60.1
		EVSUT-114	69.2	23.1	64.6	57.7	69.2	46.2	46.2	23.1	46.2	46.2	69.2	69.2	46.2
		EVSUT-121	60.2	32.2	40.2	40.2	34.2	44.2	30.1	44.2	32.2	40.2	34.2	60.2	36.2
	SEM 2	EVSUT-122	58.1	34.9	52.3	44.6	38.8	54.3	19.4	42.6	38.8	38.8	33	58.1	52.3
		EVSUT-123	65	30.4	65	21.7	54.2	54.2	43.3	65	58.5	52	47.7	47.7	43.3
		EVSUT-124	75	25	75	75	60	67.5	25	50	70	65	55	70	57.5
		EVSUT-231	64.2	49.2	49.2	53.5	62.1	51.4	32.1	42.8	47.1	59.9	53.5	59.9	53.5
		EVSUT-232	59.4	49.5	59.4	35.7	47.5	47.5	19.8	19.8	47.5	43.6	43.6	59.4	39.6
		EVSUT-233	64	42.7	64	49.1	49.1	42.7	36.3	36.3	49.1	49.1	47	57.6	57.6
		EVSUT-236	59.5	33.7	59.5	59.5	35.7	51.6	29.8	43.6	43.6	43.6	49.6	55.5	55.5
		EVSUT-241	75.9	55.7	50.6	50.6	75.9	60.7	65.8	55.7	45.6	58.2	60.7	60.7	60.7
		EVSUT-242	70.5	47	65.8	58.8	63.5	61.1	65.8	58.8	47	70.5	63.5	65.8	47
		EVSUT-245	68.2	54.6	63.6	50	68.2	63.6	50	61.4	52.3	56.8	56.8	54.6	52.3
Year 3	SEM4	EVSUT-248	61.4	61.4	51.2	47.1	61.4	47.1	49.1	45	49.1	49.1	61.4	53.2	53.2
PO / PSO wise Average (Direct)			65.12	38.34	57.9	50.04	53.21	52.08	37.9	43.53	47.16	52.52	51.45	58.94	50.16
PO Average using Indirect Method (Exit Survey)			68.24	68.72	87.52	87	85.85	86.57	87.52	88	86	84	85.85	84	83
PSO Attainment using 70% of Direct and 30% of Ind			73	54	67	62	64	63	53	57	59	62	62	67	61
PO Attainment Targets			55	55	55	55	55	55	55	55	55	55	55	55	55
Attainment % Gap			18	-1	12	7	9	8	-2	2	4	7	7	12	6