Policy for Outcome Based Education (OBE)

PEOs-POs/PSOs and CO

Formulation, Assessment and Attainment

(TIER-I)

DIT University, Dehradun

DIT University – an institution of higher learning, encouraging innovation and creativity amongst our students. The University is designed to provide holistic education, enabling students to stand on their own feet. The focus is always on promotion of self-learning and honing talents to ensure the all-round development amongst our students.

DIT University Guiding Principles

Our Vision

To be a world class professional University, constantly striving for excellence in education by high quality teaching in synchronization with the industry needs. To be driven by the spirit of ground breaking research and entrepreneurship. To instill each student qualities of mind and character necessary for good citizenship and wise leadership.

Our Mission

To put our students first and work responsibly with honesty, transparency and integrity to influence, inspire and nurture talent for our students, and the members of faculty and staff. To encourage creative ability and research temperament. To provide knowledge based technological services for industry and society. To synergize the teaching learning process through active interaction with industry and academia whilst embracing modern technological changes.

Our Core Values

- Academic excellence and integrity.
- Outstanding teaching and service.
- Encourage quest of life-long learning.
- Scholarly research and professional leadership.
- Inculcating global perspective in attitude.
- Appreciation of intellectual excellence and creativity.
- Sensitivity to social responsibility.
- Integration of human values, ethics and professional etiquettes with teaching.

Outcome-based Education

DIT University follow the Outcome-based education form 2017 batch and onwards under the choice base credit system (CBCS) curriculum across the program. it is targeted at achieving desirable outcomes (in terms of knowledge, skills, attitudes and behaviour) at the end of a program. Teaching with this awareness and making the associated effort

constitutes outcome-based education. This entails a regular methodology for ascertaining the attainment of outcomes, and benchmarking these against the program outcomes consistent with the objectives of the program.

OBE Framework

1. Correctly determining the learning outcomes at all levels and properly elaborating the curriculum.
2. Organizing the teaching and learning activity through student – centered through activity and project base learning.
3. Assessment and evaluation of all levels of learning outcomes i.e. PEOs , POs and COs

Establishment of Department's Vision and Mission Statements

In consistent of the University Vision and Mission statement each academic department of the university are formulating the department's vision an mission statement after deliberation with respective faculty members, industry experts, alumni and parents followed by discussion with BOS members.

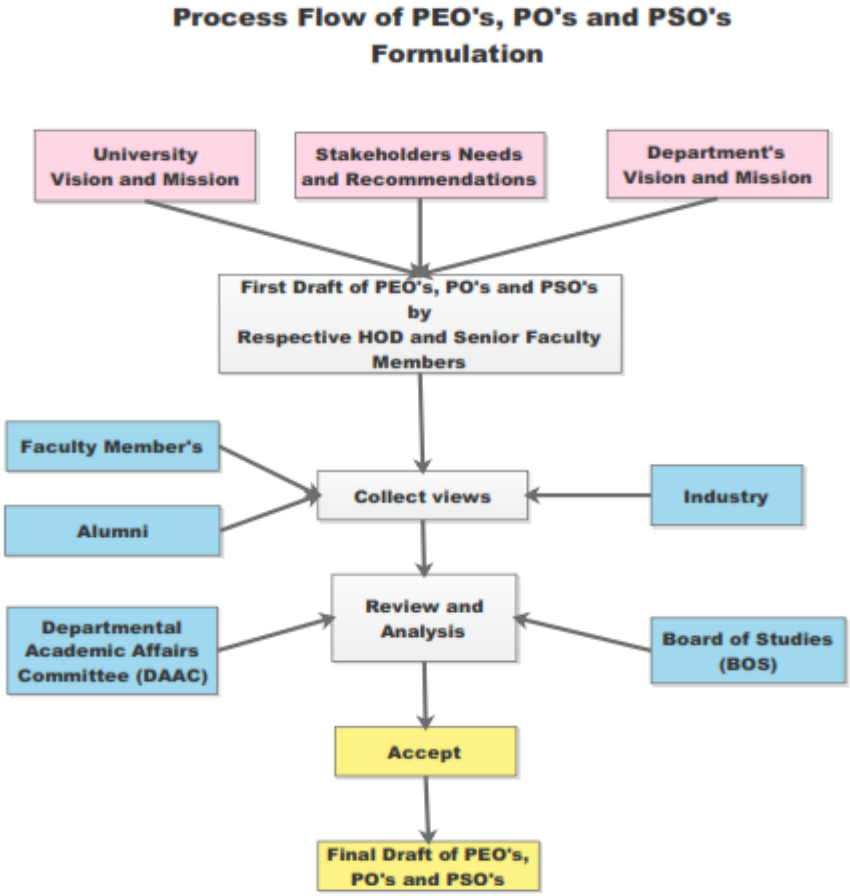
Establishment of Program educational objects, Program outcomes and Program Specific outcome.

In consistent with department vision and mission statement, the respective heads of department prepare the PEOs, and POs after due deliberation with all stake holders and finalize the same through departmental academic affairs committee (DAAC) and BOS.

Program Educational Objectives (PEOs):
Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

Program Outcomes (POs):
Program outcomes describe what students are expected to know and would be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program.

Program Specific Outcomes (PSOs):
Program Specific Outcomes are statements that describe what the graduates of a specific engineering/professional program should be able to do.



A SAMPLE OF PEOS, POS AND PSOS

PEO1-Professional Development

To develop in the students the ability to acquire knowledge of Mathematics, Science & Engineering and apply it professionally within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability with due ethical responsibility.

PEO2-Core Proficiency

To provide ability to identify, formulate, comprehend, analyze, design and solve engineering problems with hands on experience in various technologies using modern tools necessary for engineering practice to satisfy the needs of society and the industry.

PEO3- Technical Accomplishments

To equip the students with the ability to design, simulate, experiment, analyze, optimize and interpret in their core applications through multi disciplinary concepts and contemporary learning to build them into industry ready graduates.

PEO4- Professionalism

To provide training, exposure and awareness on importance of soft skills for better career and holistic personality development as well as professional attitude towards ethical issues, team work, responsibility, accountability, multidisciplinary approach and capability to relate engineering issues to broader social context.

PEO5- Learning Environment

To provide students with an academic environment and make them aware of excellence, develop the urge of discovery, creativity, inventiveness, leadership, written ethical codes and guidelines and the life-long learning to become a successful professional in Electronics and Communication Engineering.

Program Outcomes (PO): - {For B. Tech Program}

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO 6: The Engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcome (PSO):

Name of Program: - {B. Tech. CSE-BDA}

PSO 1: (Proficiency in Real life problem solving, Algorithm Design)

Display proficient morals and actualize the ideas of Computer Science and building, Software Development, Problem illuminating strategy and Algorithm Design and execution with the cutting-edge innovation and contemporary aptitudes.

PSO 2: (Proficiency in core technical areas of Computer Science & Engineering)

To present forthcoming areas like Big Data, Cloud Computing, Artificial Intelligence, Robotics, Data examination, IoT and Machine Learning to create bits of knowledge for critical thinking.

PSO 3: (Proficiency in program Design and coding and analyses / interprets data)

Execute and connect hypothetical learning by program improvement, investigation of issue and break down/translate the outcomes for fitting decisions and suggestions to a certifiable programming designing issue with a noteworthy point of view of modern, cultural and genuine world.

Publishing and dissemination of PEOs and POs/PSOs

After finalization of PEOs and POs/PSOs the respective departments are publishes and disseminate these statement among all the stakeholders through the following medium.

1. University website
2. Display in the various class rooms and laboratories.
3. Student handbooks
4. Departmental office and notice board
5. Course file and lab manual

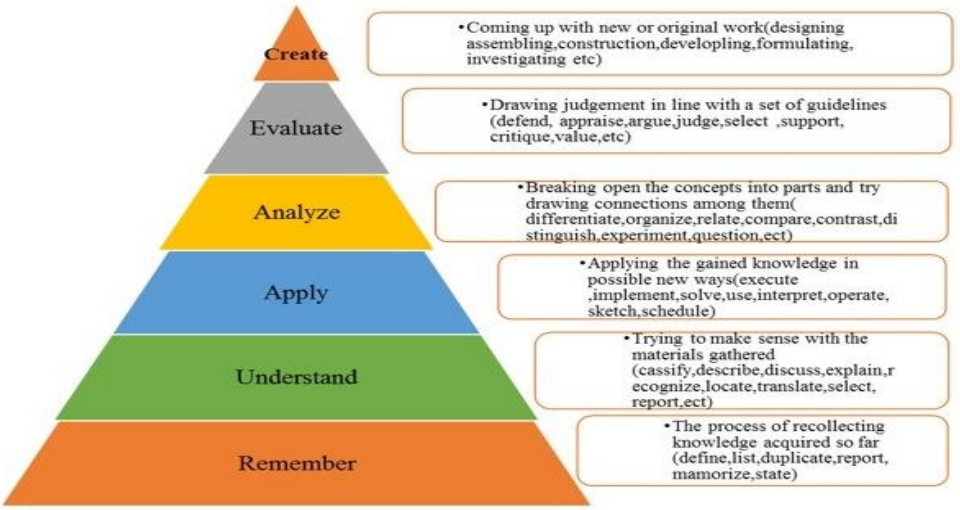
Setting up the Course Learning Outcomes

In consistent with POs/PSOs the course coordinator of a particular course are formulating the course learning outcomes. These Statements indicating what a student can do after the successful completion of a course. Every Course leads to some Course Outcomes. The CO statements are defined by considering the course content covered in each module of a course. For every course there may be 5 or 6 COs. The keywords used to define COs are based on Bloom's Taxonomy.

Bloom Taxonomy

Bloom's Taxonomy was created in 1956 under the leadership of educational psychologist Dr Benjamin Bloom in order to promote higher forms of thinking in education, such as analyzing and evaluating concepts, processes, procedures, and principles, rather than just remembering facts. It is most often used when designing educational, training, and learning processes.

Bloom Taxonomy



A sample of Course outcomes

CO	COURSE OUTCOMES DESCRIPTION
CO1	Understand and Analyze the different types of diodes, operation and its characteristics CO2
CO2	Design and analyses the DC bias circuitry of BJT and FET CO3
CO3	Design biasing circuits using diodes and transistors CO4
CO4	To analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices

Mapping of CO – PO and CO- PSO

The course coordinator do the mapping of CO- PO and CO-PSO based on the correlation between each CO with POs/PSOs as per the below levels

- 0 - Indicate there is no correlation
- 1 – Low level correlation
- 2 - Moderate level correlation
- 3 – High level correlation

Sample of CO – PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	2	1	2							2	3
CO-2	1	2									3	2
CO-3	3	1		2								
CO-4		1						1				2
CO-5		3		1		3			2		2	

Sample of CO – PSO Mapping

COs	PSO1	PSO2	PSO3	PSO4	PSO5
CO-1	2		1	2	3
CO-2		1			
CO-3	3	1		2	3
CO-4		2			2
CO-5		1			

Method of measuring attainment of POs, PSOs, and COs:

DIT University has adopted a following method of calculation of attainment of POs, PSOs, COs.

Method of calculation of attainment of COs.

Each course of a program have well-defined COs. Attainment of COs is calculated using a combination of direct methods of assessment and indirect method of assessment.

Direct Assessment: Direct method of assessment have two major components:

1. Continuous Evaluation (CE) (Assignments, Quizzes, Class Test, Laboratory performance, Mid-term examination etc.).
2. End Term Examination (ETE).

Weightage of CE and ETE will be **50%-50%** respectively and it may vary according to level of courses and program.

Indirect Assessment: Indirect method of assessment of COs is based on course exit survey performed at the end of the semester/trimester/annual.

Setting target for attainment level of performance: Targets are set at one level of

performance as follows:

- 50% or more students attain more than 50% marks (or 5 out of 10 point grades) **(Threshold**) in a direct assessment method.

Note: If target level of attainment is achieved in current year, threshold is increased for next year. Moreover, different thresholds may be set for different level as well as differences courses.

The procedure for measuring attainment level of COs of a course is as follows

Direct Assessment

Step-I. List all the components direct measurement along with weighted maximum marks allocated to each, and fill the marks of all students in each component.

Step II Apply the below formula

Course Outcome calculation

CO Attainment based on Threshold based Attainment method

For Threshold based Attainment % = (x / y) * 100
x = Count of Students >= to Threshold %
y = Total number of Students Attempted

Indirect Assessment of COs:

Indirect assessment of COs is performed using course exit survey (feedback) conducted in the end of the semester. Students are asked to rate course on a scale of 5. The components of COs attainment is set as follows:

50% or more students (participating) give 3.5 (**Threshold**) or more points

Overall Level of Attainment of COs:

The overall level of attainment of COs =
0.8 * *Attainment Level* (*Direct Assessment*) + 0.2* *Attainment Level* (*Indirect Assessment*)

Program outcomes (POs), Program specific outcomes (PSO) level of attainment calculation:

Direct assessment: Direct assessment is performed using CO-PO, CO-PSO matrix. The weighted score against each mapping shall be considered for calculation as per below matrix.

Mapping level and corresponding weightage in percentage

Mapping Level	Weightage (%age)
1 (low)	100
2 (Moderate)	60
3 (High)	40

Indirect assessment: Indirect assessment is performed using program exit survey, employer feedback, and alumni feedback.

Direct Assessment:

PO Attainment based on Weighted Average Method % age = Average of all the Course Outcomes (COs) Attainment % (Map Level Weighted Attainment %) mapped to the respective Program Outcome (PO). (as per the COs to POs mapping matrix).

Indirect Assessment: Indirect assessment of POs is performed using programme exit survey, employer's feedback, alumni survey.

Program exit survey: Program exit survey is conducted after completion of programme. Students are asked to rate program on a scale of 5. The components of POs attainment is set as follows:

- 70% or more students (participating) give 3.5 (**Threshold**) or more points

Employer's and Alumni feedback: A feedback is taken during campus visits of companies for placement. Companies are asked to gives feedback about talent of current students (participating) and previous students (employed). Companies rate student in the categories: Below Average (0), Average (1), Good (2), Excellent (3). The components of POs attainment is set as follows:

- 70% or more companies rating 2 or more points.

POs attainment (Indirect assessment) =

0.3* *Programme exit survey*) + 0.4* *Employer ' s feedback* + 0.3* *Alumni feedback*

Over POs attainment =

0.5* *Attainment Level* (*Direct Assessment*) + 0.5* *Attainment Level* (*Indirect Assessment*)

Level of PSOs attainment: It is calculated in similar manner as POs calculation is performed.

Annexure

Sample calculation matrix

CO attainment calculation (Direct)

Course - CS401 - Advanced computer netword								
Appraisal Type	CE							ET
	Mid Term	Class Test	Assignment	Quizzes	Lab Perfor	Lab Viva-V	Lab Assess	
Roll Numver/Weightage	20	5	5	5	15	5	5	40
1501011001	3.6	4.5	4	2.75	13	2.5	5	7.2
1501011003	5.6	4	4	2.75	12	2.5	4.5	11.6
1501011004	9.6	4.5	4	2.5	13	4.5	5	21.6
1501011005	9.6	3.5	4	2.75	14	3.5	5	10
1501011006	10.4	4	4	2.75	14	4.5	4.5	15.2
1501011007	12.8	4.5	5	2.75	14	4	4.5	10.8
1501011008	12.4	3	5	2.75	14	4.5	5	22.4
1501011009	6	4	5	2.5	12	4.5	5	15.2
1501011011	8.8	5	4	2.25	14	3.5	4.5	8.4
1501011012	10.4	3.5	4	3.25	14	3.5	4	7.6
1501011014	13.2	3.5	4	3.25	13	3.5	5	19.2
1501011015	14	4.5	5	3.5	15	4.5	5	26.4
1501011016	9.6	4.5	4	2.75	13	4	4	18.8
1501011018	7.6	4.5	4	3	13	3.5	4	17.6
1501011023	0.8	3	5	2.75	13	2.5	4	0
1501011024	13.6	4	5	3.5	14	4.5	5	30
1501011026	4	1.5	4	2.5	13	4	4	11.2
1501011027	8.4	4	5	3.25	14	4.5	4	12.4
1501011028	2.4	4	5	3.75	14	2.5	5	3.6

Total No of Students	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**
No of students above threshold level i.e 50%	**12**	**45**	**34**	**38**	**40**	**29**	**33**	**20**
%age of Students above threshold level	**20**	**75**	**57**	**63**	**67**	**48**	**55**	**33**
CO Contribution to different CE and ETE components								
CO1	Yes	Yes		Yes				Yes
CO2	Yes	Yes	Yes		Yes	Yes	Yes	Yes
CO3		Yes	Yes		Yes	Yes	Yes	Yes
CO4			Yes		Yes	Yes	Yes	Yes
CO5			Yes					Yes

Weighted CO Attainment calculation for CE and ETE

Course outcome/Weightage for CE and ETE	CE (50%)	ETE (50%)	Total (in %age)
CO1	26	17	43
CO2	27	17	44
CO3	30	17	47
CO4	29	17	46
CO5	29	17	46

CO attainment calculation (indirect)

Roll Number	Course Feedback (out of 5)
1501011001	2
1501011003	3
1501011004	4
1501011005	3
1501011006	5
1501011007	3
1501011008	2
1501011009	4
1501011011	4
Percentage of students giving 3.5 or more points (%age)	**68**

Overall CO Attainment

Course Outcome	CO Attainment 80% (Direct)	CO Attainment 20% (Indirect)	Overall Attainment
CO1	34.4	13.6	48
CO2	35.2	13.6	48.8
CO3	37.6	13.6	51.2
CO4	36.8	13.6	50.4
CO5	36.8	13.6	50.4

PO Attainment Calculation (Direct)

Course Outcome	CO Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	48	3	2	1	2							2	3
CO-2	48.8	1	2									3	2
CO-3	51.2	3	1		2								
CO-4	50.4		1						1				2
CO-5	50.4		3		1		3			2		2	
Weighted PO Attainment (in %age)		**40**	**30**	**10**	**26**	**-**	**50**	**-**	**20**	**30**	**-**	**36**	**36**

Overall PO Attainment Calculation (Direct and Indirect)

PO	PO Attainment (Direct)	PO Attainment (indirect)			Indirect Total	Total
		Exit Survey (30%)	Employer Feedback (40%)	Alumni feedback (30%)		
PO1	40	67	66	77	69.6	54.8
PO2	30	76	87	89	84.3	57.15
PO3	10	45	54	76	57.9	33.95
PO4	26	76	56	74	67.4	46.7
PO5	0	56	76	34	57.4	28.7
PO6	50	45	56	45	49.4	49.7
PO7	0	89	78	67	78	39
PO8	20	78	65	54	65.6	42.8
PO9	30	76	45	34	51	40.5
PO10	0	54	34	56	46.6	23.3
PO11	36	56	56	65	58.7	47.35
PO12	36	67	98	55	75.8	55.9