NED UNIVERSITY of Engineering & Technology

OUTCOME BASED EDUCATION

Implementation in BE Textile Engineering Program

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OUTLINE

- Why OBE
- Vision
- Mission
- Program Educational Objectives (PEO)
- Program Learning Outcomes (PLO)
- Course Learning Outcomes (CLO)

WHY OBE

- Role of Pakistan Engineering Council
- Washington Accord
- Jobs and other opportunities for the students
- System based on outcomes
- Graduate attributes

Program Educational Objectives

VISSION OF NED UNIVERSITY

"Be a leader in enabling Pakistan's social and economic transformation“

MISSION OF NED UNIVERSITY

“Acquire education and research excellence in engineering and allied disciplines to produce leadership and enabling application of knowledge and skills for the benefit of the society with integrity and wisdom"

VISSION OF DEPARTMENT OF TEXTILE ENGINEERING

“to produce textile engineers known for their technical excellence, leadership qualities & ethical values, so they may contribute profoundly to the society and to the profession”

MISSION OF TEXTILE ENGINEERING PROGRAM

“to provide comprehensive knowledge in the textile engineering discipline through a well-designed curricula while teaching them professional and ethical values so these graduates will be capable of fulfilling the needs of the industry and the society ”

FORMULATION OF PEOs

- The PEO statements were initially formulated by the OBE Committee of the department
- These statements were discussed in a faculty meeting and some suggestions were incorporated
- The PEO statements were presented in the meeting of Industry Advisory Board and they were approved after some discussions
- These statements were finally approved by the Board of Studies of the department followed by the Board of Faculty and Academic Council of the university

INDUSTRY ADVISORY BOARD

INTERNAL MEMBERS	EXTERNAL MEMBERS
Prof. Dr. Sheraz Hussain Siddique	Feroze 1888 Mills
Prof. Dr. Bilal Zahid	Amna Industries
Prof. Dr. M. Dawood Husain	Soorty Enterprises
Dr. Salma Farooq (Chairperson)	Archroma Pakistan
Dr. Saira Faisal	House of Habib
Dr. Agha Deedar Hussain (Area Coordinator)	Afroze Textiles
	iTextiles

PEO Statements

1. *Utilizing the sound technical knowledge in Textile engineering, mathematics and management that will lead to success in a broad range of career opportunities, and graduate education.*
2. *Ability to successfully apply critical thinking to solve contemporary issues and engineering challenges in their professional life.*
3. *Effective written, verbal and visual communication skills to disseminate ideas to the team members, customers and interdisciplinary personnel.*
4. *Awareness of ethical, legal and professional obligations so they as may contribute for the sustainable development of the environment and society*
5. *Lifelong learning and continuous self-improvement by pursuing higher education and professional developmental courses*

Table 2-1: Mapping of PEOs with University and Program Vision and Mission

Vision and Mission		Program Educational Objectives (PEOs)				
		PEO-1	PEO-2	PEO-3	PEO-4	PEO-5
University Vision	Be a leader[1-3] in enabling Pakistan's social[4] and economic transformation[1, 5].	✓	✓	✓	✓	✓
University Mission	Acquire education and research excellence[5] in engineering and allied disciplines to produce leadership[1-2] and enabling application of knowledge[3] and skills[3] for the benefit of the society[4] with integrity and wisdom.	✓	✓	✓	✓	✓
Department's Vision	To produce textile engineers known for their technical excellence[1-2], leadership qualities[3] & ethical values[4], so they may contribute profoundly to the society[4] and to the profession[5]	✓	✓	✓	✓	✓
Programme's Mission	To provide comprehensive knowledge[1-2] in the textile engineering discipline through a well-designed curriculum while teaching them professional[3-4] and ethical values[4] so as these graduates will be capable of fulfilling the needs of the industry[5] and the society[4]	✓	✓	✓	✓	✓

KEY PERFORMANCE INDICATORS FOR PEOs

Table 2-2: Key Performance Indicators (KPIs) for PEOs

		Evaluation Tool	KPI	Data Collection Frequency	Analysis Frequency
PEO	Programme	▪ Employer Feedback Survey ▪ Alumni Feedback Survey ▪ Employment Statistics	50% of the Survey Form responses must attain a score of 3 or above (on a scale of 1 to 5), and 50% of the graduates must be employed and/or engaged in higher studies.	Every Year	4 years from graduation

PROGRAM LEARNING OUTCOMES

GRADUATE ATTRIBUTES

- **Engineering Knowledge:** An ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- **Problem Analysis:** An ability to identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences and engineering sciences.
- **Design/Development of Solutions:** An ability to design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations

GRADUATE ATTRIBUTES

- **Investigation**: An ability to investigate complex engineering problems in a methodical way including literature survey, design and conduct of experiments, analysis and interpretation of experimental data, and synthesis of information to derive valid conclusions.
- **Modern Tool Usage:** An ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.
- **The Engineer and Society:** An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the responsibilities relevant to professional engineering practice and solution to complex engineering problems.

GRADUATE ATTRIBUTES

- **Environment and Sustainability:** An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- **Individual and Team Work:** An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings.

GRADUATE ATTRIBUTES

- **Communication:** An ability to communicate effectively, orally as well as in writing, 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.
- **Project Management:** An ability to demonstrate management skills and apply engineering principles to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.
- **Lifelong Learning:** Ability to recognize importance of, and pursue lifelong learning in the broader context of innovation and technological developments.

MAPPING OF PEOs TO PLOs

	Program Educational Objectives (PEOs)				
Program Learning Outcomes (PLOs)	PEO 1	PEO 2	PEO 3	PE0 4	PEO 5
PLO 1: Engineering Knowledge	✓				
PLO 2: Problem Analysis		✓			
PLO 3: Design/Development of Solutions		✓			
PLO 4: Investigation		✓			
PLO 5: Modern Tool Usage	✓				
PLO 6: The Engineer and Society				✓	
PLO 7: Environment and Sustainability				✓	
PLO 8: Ethics				✓	
PLO 9: Individual and Team Work			✓		
PLO 10: Communication			✓		
PLO 11: Project Management	✓				
PLO 12: Lifelong Learning					✓

ATTAINMENT OF PLOs

- The PLOs are attained by direct methods i.e. assessment of courses and final year projects
- For this purpose all the courses are mapped with respective PLOs as shown in Annexure D
- The PLOs could also be attained by indirect methods i.e. exit survey of the graduating students
- They are also mapped with the feed back of internship obtained from the industry

KEY PERFORMANCE INDICATORS FOR PLOs

Table 3-1: Key Performance Indicators (KPIs) for PLOs

		Evaluation Tool	KPI	Data Collection Frequency	Analysis Frequency
PLO	Student	▪ CLO scores of the student in the mapped course(s)	Each PLO must be attained in at least 50% of the respective mapped course(s), with an average score of at least 50%.	Every Semester	Every Semester
	Course	▪ PLO scores of all the students in the mapped course	At least 50% of the students must attain that PLO	Every Semester	Every Semester
	Programme	▪ Final PLO attainment statistics of all the courses including FYDP ▪ Internship Feedback Form ▪ Exit Survey	At least 50% of the mapped courses must attain the PLO and at least 50% of the students/ responses must attain a score of 3 or above on a scale of 1 to 5.	At graduation	At graduation

INTERNSHIP

- It is necessary for all the students to do internship
- The internship is mapped with the PLOs
- The internship is arranged by the internship committee of the department and the DIL
- The student internship is evaluated on the basis of the feedback form filled by the industry professionals

FYDP

- Final year Design project is done in the final year
- It is awarded in the first week of November
- It is conducted for a period of one year
- Committee for FYDP is responsible to monitor these projects

Table 3-5: Guidelines for the assessment of FYDP

Semester 1 (7th/Fall Semester)			
Mapped PLOs:	PLO-2, PLO-3, PLO-7, PLO-8, PLO-9, PLO-10, PLO-11		
Total marks:	80 (Sessional 32, Final 48)		
Outcomes / Criteria:	i. Active participation ii. Proposal: Title, problem statement, objectives iii. Literature Review & References iv. Methodology v. Timeline vi. Progress report & Presentation		
Assessment			
Item	**Weightage**	**Responsible Person**	**Evaluation Rubric**
Project Proposal	6% (12 Marks)	FYDP Steering Committee	Rubric for Project Proposal
Semester Progress	10% (20 Marks)	Supervisor	Rubric for Semester 1 Progress
Semester-1 Evaluation (Progress Report and Presentation)	24% (48 Marks)	Supervisor and Examiner	Rubric for Semester 1 Evaluation
Semester 2 (8th/Spring Semester)			
Mapped PLOs:	PLO-2, PLO-3, PLO-8, PLO-9, PLO-10, PLO-11, PLO-12		
Total marks:	120 (Sessional 48, Final 72)		
Outcomes / Criteria:	i. Active participation ii. Conduct experiments/ modeling/ study iii. Results, analysis & Discussion iv. Conclusions & Recommendations v. Final Report & Presentation		
Semester Progress	24% (48 Marks)	Supervisor and FYDP Coordinator	Rubric for Semester 2 Progress
Final Report	16% (32 Marks)	Supervisor and Examiner	Rubric for Final Report
Semester 2 Evaluation (Project demonstration and Presentation)	20% (40 Marks)	Supervisor, Examiner and Chairperson	Rubric for Semester 2 Final Evaluation

COURSE LEARNING OUTCOME

COURSE LEARNING OUTCOMES CLOs

- The course learning outcomes are defined for the courses which are mapped with PLOs in Annexure D
- The course learning outcomes are related with the Bloom Taxonomy level i.e. Cognitive, Psychomotor and Affective domains

Level	Definition	Sample verbs					Sample behaviors
KNOWLEDGE	Student recalls or recognizes information, ideas, and principles in the approximate form in which they were learned.	arrange define describe duplicate	identify label list match	memorize name order outline	recognize relate recall repeat	reproduce select state	The student will define the 6 levels of Bloom's taxonomy of the cognitive domain.
COMPREHENSION	Student translates, comprehends, or interprets information based on prior learning.	explain summarize paraphrase describe illustrate classify	convert defend describe discuss distinguish estimate explain	express extend generalized give example(s) identify indicate	infer locate paraphrase predict Recognize	rewrite review select summarize translate	The student will explain the purpose of Bloom's taxonomy of the cognitive domain.
APPLICATION	Student selects, transfers, and uses data and principles to complete a problem or task with a minimum of direction.	use compute solve demonstrate apply construct	apply change choose compute demonstrate discover dramatize	employ illustrate interpret manipulate modify operate	practice predict prepare produce relate schedule	show sketch solve use write	The student will write an instructional objective for each level of Bloom's taxonomy.
ANALYSIS	Student distinguishes, classifies, and relates the assumptions, hypotheses, evidence, or structure of a statement or question	analyze categorize compare contrast separate apply	change discover choose compute demonstrate dramatize	employ illustrate interpret manipulate modify operate	practice predict prepare produce relate schedule	show sketch solve use write	The student will compare and contrast the cognitive and affective domains.
SYNTHESIS	Student originates, integrates, and combines ideas into a product, plan or proposal that is new to him or her.	create design hypothesize invent develop arrange assemble	categorize collect combine comply compose construct create	design develop devise explain formulate generate plan	prepare rearrange reconstruct relate reorganize revise	rewrite set up summarize synthesize tell write	The student will design a classification scheme for writing educational objectives that combines the cognitive, affective, and psychomotor domains.
EVALUATION	Student appraises, assesses, or critiques on a basis of specific standards and criteria.	Judge Recommend Critique Justify Appraise Argue	Assess Attach Choose Compare Conclude Contrast	Defend Describe Discriminate Estimate Evaluate Explain	Judge Justify Interpret Relate Predict	Rate Select Summarize Support Value	The student will judge the effective-ness of writing objectives using Bloom's taxonomy.

Reference: http://chiron.valdosta.edu/whuitt/col/cogsys/bloom.html

Table 2: Psychomotor domain categories, definitions and alternate verbs.

Psychomotor Domain
(doing, skills)

Perception

Definition:
Senses cues that guide motor activity.

Sample Verbs:
- detect
- hear
- listen
- observe
- perceive
- recognize
- see
- sense
- smell
- taste
- view
- watch

Set

Definition:
Is mentally, emotionally, and physically ready to act.

Sample Verbs:
- achieve a posture
- assume a body stance
- establish a body position
- place hands, arms, etc.
- position the body
- sit
- stand
- station

Guided Response

Definition:
Imitates and practices skills, often in discrete steps.

Sample Verbs:
- copy
- duplicate
- imitate
- manipulate with guidance
- operate under supervision
- practice
- repeat
- try

Mechanism

Definition:
Perform acts with increasing efficiency, confidence, and proficiency.

Sample Verbs:
- complete with confidence
- conducts
- demonstrate
- execute
- improve efficiency
- increase speed
- make
- pace
- produce
- show dexterity

Complete Overt Response

Definition:
Performs automatically.

Sample Verbs:
- act habitually
- advance with assurance
- control
- direct
- excel
- guide
- maintain efficiency
- manage
- master
- organize
- perfect
- perform automatically
- proceed

Adaption

Definition:
Adapts skill sets to meet problem situation.

Sample Verbs:
- adapts
- recognizes
- alters
- revises
- changes

Organization

Definition:
Creates new patterns for specific situations.

Sample Verbs:
- designs
- originates
- combines
- composes
- constructs

Table 5: Affective domain categories, definitions and alternate verbs.

Affective Domain
(feelings, attitudes)

Receiving

Definition:
Selectively attends to stimuli.

Sample Verbs:
- accept
- acknowledge
- be aware
- listen
- notice
- pay attention
- tolerate

Responding

Definition:
Responds to stimuli.

Sample Verbs:
- agree to
- answer freely
- assist
- care for
- communicate
- comply
- conform
- consent
- contribute
- cooperate
- follow
- obey
- participate willingly
- read voluntarily
- respond
- visit
- volunteer

Valuing

Definition:
Attached value or worth to something.

Sample Verbs:
- adopt
- assume responsibility
- behave according to
- choose
- commit
- desire
- exhibit loyalty
- express
- initiate
- prefer
- seek
- show concern
- show continual desire to
- use resources to

Organization

Definition:
Conceptualizes the value and resolves conflict between it and other values.

Sample Verbs:
- adapt
- adjust
- arrange
- balance
- classify
- conceptualize
- formulate
- group
- organize
- rank
- theorize

Internalizing

Definition:
Integrates the value into a value system that controls behavior.

Sample Verbs:
- act upon
- advocate
- defend
- exemplify
- influence
- justify behavior
- maintain
- serve
- support

ATTAINMENT OF CLOs

- The course learning outcomes are assessed by using direct assessment methods such as:
- Test
- Mid-term exam
- Final exam
- Assignment
- Quiz
- Complex engineering problem
- Open ended labs

KEY PERFORMANCE INDICATORS FOR CLOs

Table 3-2: Key Performance Indicators (KPIs) for CLOs

		Evaluation Tool	KPI	Data Collection Frequency	Analysis Frequency
CLO	Student	▪ Course work	The student must obtain at least 50% average percentage score from all attempts.	Every Semester	Every Semester
	Course	▪ CLO scores of all students in the course	At least 50% of the students must attain that CLO	Every Semester	Every Semester

CONTINUOUS QUALITY IMPROVEMENT (CQI)

Table 9-1: Actions to be taken for PEO, PLO and CLO CQI

	PEO CQI	PLO CQI			CLO CQI	
	Program KPI	**Student KPI**	**Course KPI**	**Programme KPI**	**Student KPI**	**Course KPI**
KPIs Achieved	▪ No Action	▪ No Action	▪ No Action	▪ No Action	▪ No Action	▪ No Action
KPIs Not Achieved	1. Review of curriculum strategies. 2. Review of assessment methods. 3. Review of the relevant KPIs. 4. Review of PEOs. 5. Revisions implemented.	1. Warning through the progressive attainment sheet. 2. Student counselling.	1. Review of teaching and learning process. 2. Review of CLOs assessment methods. 3. Review of CLO-PLO mapping and the relevant KPIs. 4. Review of curriculum design. 5. Revisions implemented.	1. Review of teaching and learning process. 2. Review of PLOs assessment methods. 3. Review of Course-PLO mapping and the relevant KPIs. 4. Review of curriculum design. 5. Revisions implemented.	1. Student provided further chances through direct assessment tools. 2. Student counselling.	1. Review of CLO assessment methods. 2. Review of CLOs and taxonomy levels. 3. Review of students' course feedback. 4. Review of CLO KPIs. 5. Faculty advice by Departmental OBE Cell. 6. Faculty training.

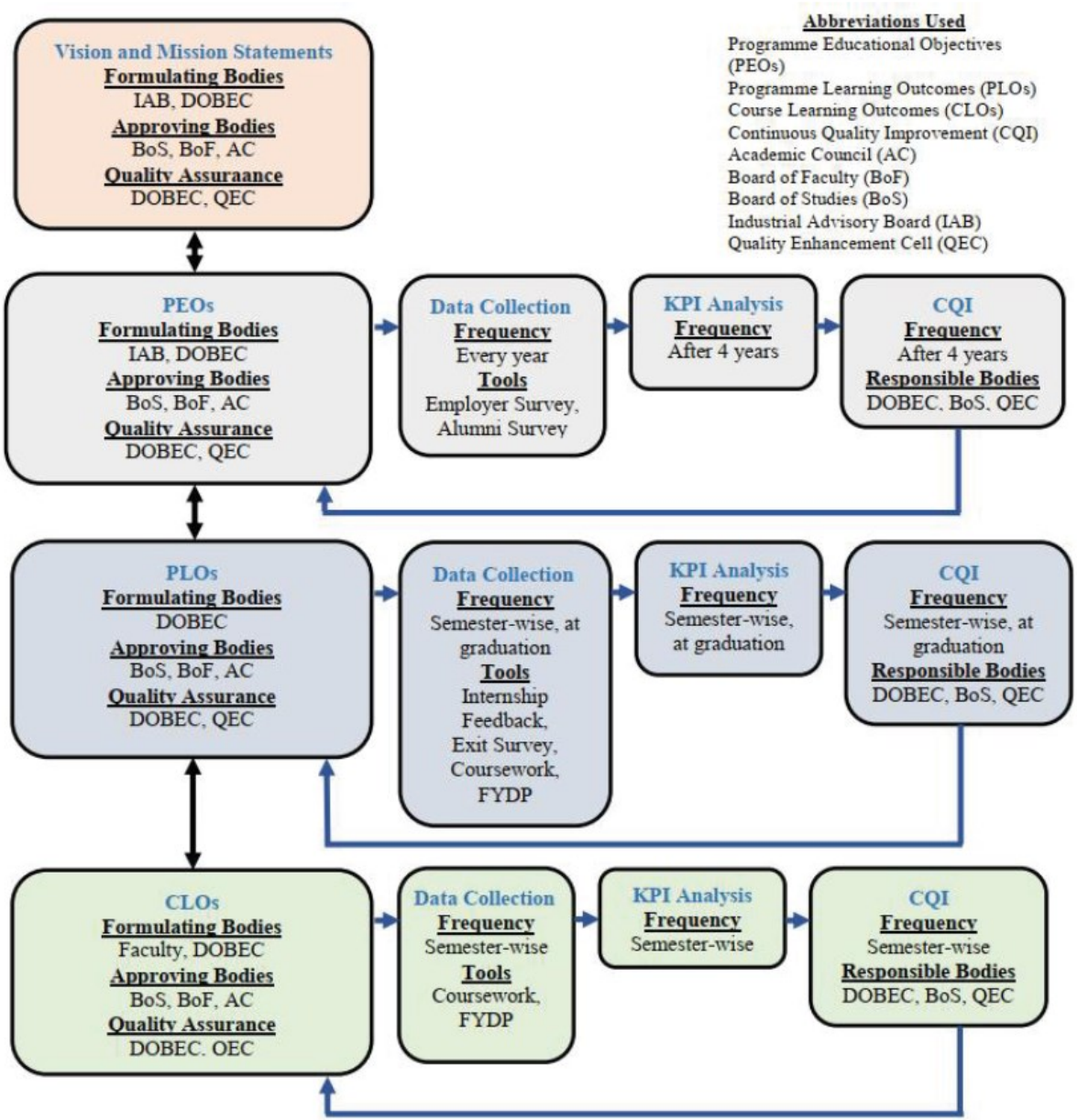

Figure 9-1: CQI process flow chart

THANK YOU