



SILVER OAK UNIVERSITY

College of Technology (01)

Bachelor of Technology in

AE/CH/CE/CE(MLAI, CC)/CSE(CS)/IT/EC/CL/EE/ME/CSBS

Subject Name: Problem Based Learning-II

Subject Code: 1010003392

Semester: VI

Prerequisite: Basics of Engineering Science

Objective:

In Problem based learning –II, students identify problems of interest to them and experiment to find solutions, as well as design complex systems that integrate engineering fundamentals in a multidisciplinary approach. Problem-based learning is a widespread teaching method in disciplines where students must learn to apply knowledge, not just acquire it. Problem-based learning derives from the theory that learning is a process in which the learner actively constructs knowledge. PBL focuses on problem formulation as well as problem solving. It seeks to simulate real-world engineering research and development.

Teaching and Examination Scheme:

Teaching Scheme					Evaluation Scheme				Total Marks
L	T	P	Contact Hours	Credit	Theory		Practical		
					CIE (TH)	ESE (TH)	CIE (PR)	ESE (PR)	
0	0	2	2	1	-	-	40	60	100

Content:

Unit No.	Contents	Teaching Hours	Weightage %
1	Understanding the Concept of Problem Based Learning <ul style="list-style-type: none"> Work through the orientation materials. Read the syllabus, course calendar, and course requirements information. Post an introductory message. 	4	10
2	Identify the Problem Based Learning <ul style="list-style-type: none"> Review of the Standards-Focused Problem Based Learning Model. Review of sample problems. Discussion and assignment. 	4	10
3	Module 1: Begin with the End in Mind <ul style="list-style-type: none"> Work through all portions of the module. discussion and assignment. 	4	10
4	Module 2: Craft the Driving Question	4	10

	<ul style="list-style-type: none"> • Work through all portions of the module. • discussion and assignment. 		
5	Module 4: Map the Problem <ul style="list-style-type: none"> • Work through all portions of the module. • discussion and assignment. 	4	10
6	Module 5: Manage the Process <ul style="list-style-type: none"> • Work through all portions of the module. • discussion and assignment. 	4	10
7	Develop a PBL Unit: Part #1 (report / (presentation) <ul style="list-style-type: none"> • Work independently on unit 	8	20
8	Final Review of Problem <ul style="list-style-type: none"> • Complete and submit PBL unit evaluation form for self and peer(s). 	4	20

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Select the Appropriate Problem Statement based on the area of interest	1, 2
CO-2	Design your Problem Statement as per the market requirement	2, 3
CO-3	Prepare and Map the Solution with the Proposed Problem Statement	4, 5
CO-4	Build the Mathematical Model and/or Prototyping of Problem Based Learning	6
CO-5	Design and develop one research paper on the basis of the proposed Problem Statement (Students Problem Based Learning concept must be showcased in Techfest / Project Exhibition / Other Competitions)	6, 7
CO-6	Students must validate their project/problem model / Test report with standard testing lab / research lab/any other manner & Identify the Future Scope or Research Scope of Problem Based Learning	7,8

Teaching & Learning Methodology: -

The various methods or tools follows by the faculties to teach the above subject are:

1. Lectures with discussions, question and answer sessions, informal quizzes, video sessions where students have an opportunity to clear concepts and doubts
2. E – Resources for the virtual learning environment. Practical sessions for developing skills which are required in occupation
3. Occasional Flipped classroom exercise for students for development of presentation skills.

List of Proposed Problem Statements for Selection

The students will have to solve at least one problem statement or any related problem statement as per your area of interest from following multidiscipline topics:

1. Energy – Application of 4 R’s – Reduce, Reuse, Renew and Regenerate
 - Hydraulic energy
 - Hydrogen Energy
 - Water irrigation, Water harvesting
 - Transportation
2. Smart & Clean Campus
 - Resource Availability & Efficient Resource Utilization
 - Library
 - Voice based Assistance of Library
 - Smart Attendance System
 - Smart Transportation
 - Canteen - Management of Food Preparation and Maintain hygiene
 - Clubs
 - Smart Parking
3. Cleanliness – Good Health and Well Being
4. Water Harvesting
 - Purification and Generation
 - Rechargeable Ground Water
 - Water Conservation
 - Clean Water and Sanitation
5. Noise/Air Pollution
 - Sustainable Cities and Communities
 - Global Warming
 - In Organizations/On Roads / Public Places
6. Social Awareness
 - 100 % Literate Campus
 - Tobacco free Campus
 - Zero Accidental Zone
 - Fire Safety Educational Awareness Programs
7. Environment
 - Green Revolution
 - Reduction in Pollution
 - Reduction in Congestion and Waiting time at crowded places
8. Cyber Security
 - Application security
 - Network Security
 - Computer Forensics
 - Mobile Forensics
 - Fraud Detection & Prevention
9. Artificial Intelligence & Robotics

- Data Analysis
- Virtual Assistant
- Prediction/Forecasting
- Automation System
- Defence systems
- Drones
- Surveillance systems
- Automation System
- Additive Manufacturing
- Industrial Internet of Things (IIoT)

10. Healthcare Technologies and Devices

- Innovative Product design to combat diseases like COVID-19, SARS, Flue, Viral infections, Bacterial infections etc
- Innovative Product design for Physically challenged people.
- IOT based health care system
- Oxygen supply system for patient
- Diseases detection system

11. Basic Consumer Products

- Human Effort reducing products
- Smart Industrial Product
- Academic Laboratory Products

12. Modern and Smart Civil Engineering

- Advance Technology in Surveying
- Earthquake Resistant Wooden House
- Labour Optimization in Earth Work
- Fatigue of Human Labour in Earth Work
- Silica Fume Concrete
- Fly-Ash Concrete Pavement
- Non-Destructive Testing of Concrete
- Flexible Pavement
- Rural Road Development
- Highway Safety
- Automated Highway Systems
- Study and Manufacture of Masonry Blocks Different Machines with Different Materials
- Experimental/Investigation On Replacement of Sand by Graded Quarry Dust in Concrete
- Size Effect of Masonry Join On Compressive Strength of Stabilized Mud Blocks
- Low Cost Lightweight Roofing Tiles

13. Nanoscience / Nanotechnology:

- Rheology of Nano-fluids
- Nano-membranes
- Safety test of Nano-materials
- Fuel cells made with Nano-polymers
- Air & water filtration devices
- Water desalination using multi-layer Nano porous Graphene membranes

- Water desalination using Nano-structured materials
14. Renewable or Alternative energy sources/ Green chemistry:
 - Existing facilities & Future opportunities of renewable energy sources in India (Wind / Tidal / Geothermal energy)
 - Cost reduction of energy
 - Bionic leaf
 - Leachate treatment
 - Pyrolysis of bamboo wood
 15. Hydrogen Production:
 - Green methods for hydrogen production
 - Bio-mass thermo-catalytic routes
 - Artificial photosynthesis
 - Water splitting
 16. Manufacturing Problems:
 - Controlling Crystallization
 - Effect of non-condensable gases on flow boiling
 - Pollution control in manufacturing industry
 17. Equipment Design
 - Design of Tray / Packed column model
 - Design of a Gravity Screening Process for Particle Separation
 - Design of shell and tube heat exchanger
 18. Waste management
 - Absorption of dye from textile industry waste water
 - Investigate the effect of domestic wastewater on soil
 - Absorption of oil from emulsion (water-oil)
 - Oxidation of iron oxide in presence of garden waste in inert atmosphere
 - Bio-oil synthesis from agricultural waste
 - Survey on hospital waste management process in Covid-19 pandemic
 - Laboratory Waste Management
 - Zero Liquid Discharge (ZLD)
 - Radioactive Waste Management & Disposal
 19. Synthesis of material
 - Synthesis of ethanol from beetroot
 - Extraction of charatin from bitter guard
 - Synthesis of silica aerogel and Investigate their properties

Books Recommended: -

1. Problem-Based Learning: An Inquiry Approach by John F. Barel (Author)
2. The Practice of Problem-Based Learning: A Guide to Implementing PBL in the College Classroom, by José A. Amador (Author), Libby Miles (Author), Calvin B. Peters (Author)
3. Problem-based Learning: Welcome to the "Real World": A Teaching Model for Adult Learners, by Dr. Wendy J. Flint
4. The Power of Problem-Based Learning, by Barbara J. Duch (Editor), Susan E. Groh (Editor), Deborah E. Allen (Editor)
5. Problem-Based Learning for Math & Science: Integrating Inquiry and the Internet, by Diane L. Ronis (Author)

6. The Challenge of Problem Based Learning, by David Boud (Author), Grahame Feletti

List of Open-Source Software/learning website:

- <https://my.pblworks.org/resources>
- <https://www.hunschool.org/resources/problem-based-learning>
- <https://www.advance-he.ac.uk/knowledge-hub/problem-based-learning-uk-physical-sciences-subject-centre>
- <https://www.ucd.ie/t4cms/Problem-based%20Learning%20Module%20Handbook.pdf>
- <https://onlinelibrary.wiley.com/doi/pdf/10.1046/j.1365-2923.1997.00671.x>
- https://www.researchgate.net/publication/260795623_The_Effects_of_Problem_Based_Learning_on_Self_Directed_Learning_Skills_among_Physics_Undergraduate
- https://www.en.aau.dk/digitalAssets/66/66555_pbl_aalborg_modellen-1.pdf
- <https://files.eric.ed.gov/fulltext/EJ1112940.pdf>