

Faculty of Engineering & Technology

Fundamental Digital Applications in Petroleum Engineering

Information :							
Course Code :	PET 508	Level	:	Undergraduate	Course Hours :	3.00- Hours	
Department : Department of Petroleum Engineering							
Area Of Study :							
The Main Goals of this course are: ÁUnderstand the basic theory behind the finite element method ÁUse the finite element method for the solution of practical engineering problems ÁUse the Visual Basic in PVT models. ÁUnderstand the concept of digitizing. ÁUse the Matlab in the numerical methods.							

Description :

This course includes applications of Windows-based Visual Basic solutions to engineering problems including selected topics in fluid flow, PVT behavior, matrices in engineering solutions, translating curves to computer solutions, predictor-corrector material balance solutions, and graphical display of results.

Course outcomes :

a.Knowledge and Understanding: :				
1 -	Outline the approximation in engineering problems			
2 -	Explain the concept of analytical, numerical methods			
3 -	Explain the underlying mathematics behind finite element analysis software solvers			
4 -	Outline the finite element study to investigate a real-world engineering problem			
5 -	Explain the underlying basis of physical laws relevant to the course topics, discussing their applications and appreciating their relation to the topics to the topics of other courses taken			
6 -	Describe qualitatively and quantitatively process, relationships and techniques relevant to the topics included in the course outline.			
b.Intellectual Skills: :				
1 -	Demonstrate different numerical methods to solve large petroleum problems			
2 -	Write MATLAB program using different numerical methods			
3 -	Solve the different problems using MATLAB			
4 -	Apply the Visual Basics in building the PVT Models			
c.Professional and Practical Skills: :				
1 -	Apply the Finite Element Method to practical situations, with specific emphasis on its application to petroleum engineering problems			
2 -	Use computer program to solve the problems using the concept of numerical methods			



d.General and Transferable Skills: :

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Use MATLAB program to solve different problems related to petroleum engineering and present the results within multidisciplinary team.

Course Topic And Contents :

Торіс	No. of hours	Lecture	Tutorial / Practical
Introduction to FEA; Discretization; FE Terminology	8	6	2
A General FE Problem Solving Approach; Modelling Assumptions;	5	3	2
Validation; Sources of Error in FE; Computational Resources;	5	3	2
Introduction to Visual Basics	10	6	4
Building PVT model using the visual basics	7	3	4
Newton Raphson method; Bisection method Secant method; False Position method; introduction to MATLAB; Mathematical functions	10	6	4
Basic plotting; Matrix generation; Introduction to programming in MATLAB;	8	6	2
Control flow and operators in MATLAB;	10	6	4
Numerical methods in MATLAB	5	3	2
Field problems	7	3	4

Teaching And Learning Methodologies :
Interactive Lecturing
Discussion
Problem-based Learning
Research
Experiential Learning

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Methods of assessment	Relative weight %	Week No	Assess What
Assignment	10.00		
Final Exam	40.00		
Lab. Exam	5.00		
Mid- Exam	25.00		
Participation	10.00		
Quizzes	10.00		