### Reservoir Engineering I

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Reservoir Engineering I</th>
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<tbody>
<tr>
<td>Reference No.</td>
<td>EAX_5_279/PTRL02H05</td>
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<tr>
<td>Level</td>
<td>5</td>
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<tr>
<td>Credit Value</td>
<td>10 credit points</td>
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<tr>
<td>Student Study Hours</td>
<td>Contact hours: 22 lectures + 12 Tutors</td>
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<tr>
<td>Pre-requisite learning</td>
<td>-</td>
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<tr>
<td>Excluded combinations</td>
<td>-</td>
</tr>
<tr>
<td>Module co-ordinator (Name + Email)</td>
<td>Prof. Shedid A. Shedid, Building H-314 <a href="mailto:Shedid.shedid@bue.edu.eg">Shedid.shedid@bue.edu.eg</a></td>
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<tr>
<td>Faculty/Department</td>
<td>Engineering / Petroleum &amp; Natural Gas Engineering</td>
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<td>Short Description</td>
<td>Reservoir description techniques, reservoir drive mechanisms, under saturated reservoirs, saturated reservoirs, volumetric calculation of OOIP, Diffusivity equation-derivation and solution techniques, material balance equation (MBE) applications for different drive mechanisms, immiscible displacement, field development plans, enhanced oil recovery methods.</td>
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| Aims | The aim of this module is for student to:
1. Understand the concepts and elements of reservoir engineering and apply these in maximizing oil recovery.
2. Analyse assumptions of reservoir engineering equations with emphasis directed to parameter significance and understanding the results. |
| Learning Outcomes | **Knowledge and Understanding:**
On completion of this module students should be able to demonstrate knowledge and understanding of:
1. Concepts of reservoir engineering;
2. Characteristics and behaviour of different reservoir types;
3. Types of oil recovery: primary, secondary, and enhanced.

**Intellectual Skills:**
4. Characterize different reservoir types and drive mechanisms;
5. Estimate, quantitatively, oil reserve and predict future reservoir performance;
6. Use information in reservoir engineering and field development planning and set a plan to maximise hydrocarbon recovery;

**Practical Skills:**
7. Derive and solve Diffusivity equation
8. Apply superposition technique for calculating well pressure
9. Apply material balance equation to (a) calculate initial-oil-in-place (IOIP) and predict derive mechanism
10. Apply Buckley-Leverett Model for immiscible water flooding

**Transferable Skills:**
11. Develop computational data analysis and modelling skills
12. Provide understanding of application of partial differential equation
<table>
<thead>
<tr>
<th>Elements &amp; weighting</th>
<th>Assessment Elements &amp; weightings</th>
<th>Indicative Sources (Reading lists)</th>
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</table>
| To prepare student to get job and be professional graduate in future, the development of one or more of top engineering skills, namely problem solving, communication, management and environment and economics, is addressed in this module. Personal development planning is also one of our focuses in this module. | Total student effort for the module: 100 hours on average. **Teaching & Learning:**  
- 22, 1h lectures. This method informs learning outcomes 1, 2, 3, 4.  
- H.C.Slider, "Practical Petroleum Reservoir Engineering (PDE) and solving techniques  
13. Develop complete vision about life cycle of oil reservoir for better development  

<table>
<thead>
<tr>
<th>Indicative content</th>
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<td>Review of reservoir rock and fluid properties; Primary recovery mechanisms (fluid and rock expansion, solution gas drive, water drive, gas-cap drive); volumetric (oil and gas in place); Theory and assumptions of material balance equation (MBE); Calculation of oil in place by material balance for under-saturated and saturated reservoirs; Production forecasting using material balance equation; Faults and imaginary wells; Aquifers and derivation of the diffusivity equation, dimensionless variables, solutions of the diffusivity equation and radius of investigation, multiple wells, line source solution, principles of superposition theory. Water influx; water coning; Introduction to Secondary and tertiary oil recovery.</td>
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**Assessment:**  
- **Examination:** A 180 minute unseen written examination assesses learning outcomes 1, 2, 3, 4, 5, 6, 7.  
- **Course Work:** 20% Two in class assignments and 10% one take home assignment. This method assesses learning outcomes 8, 10, 11, 12.  
- Students must achieve (i) 40% for the total module mark and (ii) at least 30% in the unseen examination and the course work in order to achieve an overall passing mark for this module.  

**Course Work:**  
- 10%  
- 20% Two in class assignments and 10% one take home assignment. This method assesses learning outcomes 8, 10, 11, 12.