## Physical Chemistry for Petroleum Engineering

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Physical Chemistry for Petroleum Engineering</th>
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<tbody>
<tr>
<td>Level</td>
<td>s</td>
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<tr>
<td>Reference No. (showing level)</td>
<td>EAX_S_259/CHME01C04</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 + 22 Tutorials, Student managed learning hours: 100</td>
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<tr>
<td>Pre-requisite learning</td>
<td>-</td>
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<td>Co-requisites</td>
<td>-</td>
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<tr>
<td>Excluded combinations</td>
<td>-</td>
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<tr>
<td>Module co-ordinator (Name + Email)</td>
<td>Dr. Ahmad Mohammad, <a href="mailto:Ahmad.Mohammad@bue.edu.eg">Ahmad.Mohammad@bue.edu.eg</a></td>
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<tr>
<td>Faculty/Department</td>
<td>Engineering/Petroleum and Natural gas technology</td>
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### Aims
This module is designed to give students a broad background, basic knowledge and basic definitions in physical chemistry to prepare them effectively for subsequent degree level studies in petroleum engineering. The main aims of this module are to help students to:

- be familiar with the properties and conditions of ideal and real gases, and to learn about the gas laws;
- learn about the stoichiometry and kinetics of chemical reactions and to be able to implement the concept of limiting reactant in chemical reactions;
- get information about the different types of solutions and solutions’ composition as well as their colligative properties;
- study the different types of phase diagrams.

### Learning Outcomes

**Knowledge and understanding**

On completion of this module students should be able to demonstrate knowledge and understanding of:

1. the postulates of the kinetic molecular theory and the deviation’ reasoning of real gases;
2. the core concepts associated with physical chemistry such as the limiting reactant, rate equation, order of chemical reactions, solution properties, phase diagrams;

**Subject-specific cognitive skills**

On completion of this module students should be able to/demonstrate ability in:

3. applying the appropriate mathematical formula to solve the problems related to the contents of this module;
4. understand physical chemistry laws

**Key/transferable skills**

On completion of this module students should be able to/demonstrate ability in:

5. developing problem solving skills and critical thinking.
6. Apply learned chemical knowledge in petroleum eng.
### Practical Skills
- Apply physical chemistry laws in rock dissolution calculation
- Trained on lab measurements/experiments.

### Employability
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.

### Teaching and learning pattern
1. 11, 2h lectures. This method informs learning outcomes 1, 2, 3, 4.
2. 22, tutorials. This method informs learning outcomes 5, 6, 7, 8.

### Indicative content
- Properties of gases
- Kinetic theory and transport properties of gases and its applications
- Spontaneity criteria of processes
- Stoichiometry and limiting reactant calculations,
- Colligative properties of solutions,
- Chemical kinetics and rate of reactions
- Phase diagrams,

### Assessment

#### Elements & weightings
- **Examination:** A 180 minute unseen written examination assesses learning outcomes 1, 2, 3, 4, 5, 6, 7, 8. 70%
- **Course Work:** Two in class assignments assesses learning outcomes 1, 2, 3, 4, 5, 6, 7, 8. 30%
- 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.

### Indicative Sources

#### (Reading lists)