Physics for Petroleum Engineers

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Physics for Petroleum Engineers</th>
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<tbody>
<tr>
<td>Level</td>
<td>S</td>
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<tr>
<td>Reference No.</td>
<td>EAX_S_261/PHYE04C03</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: 24, 1h Lectures + 12, 1h tutorial + 6, 3h lab sessions</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>Prof. Amer El-korashy <a href="mailto:Amer.el-korashy@bue.edu.eg">Amer.el-korashy@bue.edu.eg</a></td>
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<tr>
<td>Faculty/Department</td>
<td>Engineering/Petroleum and Natural gas</td>
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<td>Short Description</td>
<td>This module concerned with radiation, electricity, magnetism, energy.</td>
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<td>Aims</td>
<td>To give petroleum engineering students a basic knowledge and understanding of related topics in physics that can help them in their study and the application of this science in petroleum engineering practices.</td>
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| Learning Outcomes | Knowledge and understanding  
On completion of this module students should be able to demonstrate knowledge and understanding of:  
1. have a basic understanding of physics and its application in the petroleum engineering field  
2. using technical vocabulary of physics where appropriate;  
Subject-specific cognitive skills  
On completion of this module students should be able to/demonstrate ability in:  
3. explain the laws of physics associated with this module using the relevant terminology where appropriate;  
4. gain more knowledge about radiation handling and safety;  
Subject-specific practical skills  
On completion of this module students should be able to/demonstrate ability in:  
5. solve simple problems;  
6. conduct experiments which validate theories correlated to the module course;  
Key/transferable skills  
On completion of this module students should be able to/demonstrate ability in:  
6. analyze initial assumptions introduced when presenting a problem;  
7. enhance their problem solving capabilities;  
8. gain experience in explaining high level concepts. |
| 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) 24, 1h Lectures. This method informs learning outcomes 1, 2, 3, 4, 5.  
2) 12, 1h tutorial sessions. This method informs learning outcomes 4, 6, 7, 8.  
3) 6, 3h lab sessions. This method informs learning outcomes 6. |
### Indicative content

- **State of matter**: tension compression, shear pressure, ideal fluid motion, viscosity.
- **Wave**: motion, superposition, standing wave, sound interface, resonance, Doppler Effect.
- **Fluid Mechanics**: pressure, variation of pressure with depth, buoyant forces and Bernoulli’s equation.
- **Kinematics and dynamics** of particles and rigid bodies, gravitation, equilibrium, conditions for equilibrium, elastic properties of solids, examples of rigid objects, Bonding in solids, conduction in solids.
- **Introduction to diffraction**, the diffraction grating, diffraction of X-rays by crystals, interference and polarisation of light waves, vibrations.
- **Basic nuclear structure**, nuclear models, radioactivity, nuclear reactions, radiation damage, radiation detectors, radiation safety and uses of radiation.

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### Assessment Elements & weightings

- **Examination**: A 180 minute unseen written examination assesses learning outcomes 1, 2, 3, 4, 6, 7, 8. 
  
  **Course Work**: 15% laboratory reports assesses learning outcome 5 and 15% formative essay assesses learning outcome 3 and 4.

- 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.

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### Indicative Sources (Reading lists)


- **Murray, Raymond LeRoy, “Nuclear energy: an introduction to the concepts, systems, and applications of nuclear processes” Butterworth-Heinemann/Elsevier, 2009.**