EN6903  Mechanical Fundamentals

Course Aim  To provide students with an understanding of the principles of engineering mechanics

Short Title  EDICT

Faculty

Credits  15

Pre-requisites  None

Co-requisites  None

Anti-requisites  None

Version  2

Effective From  September 1, 2016

NQF Level  6

Student Contact hrs  90

Self-directed hrs  60

Other directed hrs  0

Total learning hrs  150

Learning Outcomes  On successful completion of this course, students will be able to:

1. Demonstrate an understanding of SI Units, fundamental, supplementary & derived units, and apply the concepts of mass, force, moments, torque and equilibrium conditions in engineering systems.

2. Apply the concepts of energy, energy conservation and conversion as related to mechanical engineering systems.

3. Analyse & solve linear motion problems involving inertia, momentum and impulse to formulate requirements of power and energy needs.

4. Examine and solve angular motion problems including centripetal and centrifugal forces and rotational inertia for various engineering applications.

5. Justify & apply the laws of friction to simple engineering problems.

NQF Sub-strand  Theoretical Understanding

Practical Application of Knowledge

Theoretical Understanding

Practical Application of Knowledge

Practical Application of Knowledge

Topics / Content  • Engineering terms, SI Units, fundamental, supplementary & derived units, Mass, force, moments, torque, equilibrium conditions, etc • Vector modelling of force systems and drawing free body diagrams. Determining unknown forces using analytical and graphical techniques (triangle and polygon of forces) • Energy, work, and power. Energy forms, conservation and conversion of energy • Linear motion, F = ma, inertia, momentum and impulse • Angular motion, equations and examples, centripetal and centrifugal forces and applications. Moments of inertia, radius of gyration and applications • Friction between bodies • Combined linear & angular motion, and applications • Machines, law of the machine, mechanical advantage, velocity ratio, mechanical efficiency, limiting efficiency, overhauling

Learning and Teaching Strategies  The major emphasis is on practical achievement. Each student will complete one main practical project within a team and Labs to obtain the skills necessary to analyse and interpret results. Underpinning knowledge will be supported by PBL based worksheets and consolidated by tests. During sessions students will be given group demonstrations and individual instruction as required. They will also be given the opportunity to discuss their work in detail at anytime.

Completion Requirements  To obtain a Pass grade, a student must achieve a minimum of 60% aggregated over all assessments.
<table>
<thead>
<tr>
<th>Assessment</th>
<th>Assessment Task Description</th>
<th>Weight (%)</th>
<th>Must Pass (Y/N)</th>
<th>Learning Outcomes Assessed</th>
<th>Form of Assessment Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labs:</td>
<td>Practical labs cover a broad range of underpinning knowledge and practical skills specified in 'course content' Emphasis is on developing practical problem solving skills and analysis of results</td>
<td>30%'</td>
<td>N</td>
<td>1,2,3,4,5</td>
<td>Practical project</td>
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<tr>
<td>Project:</td>
<td>A practical problem based project aimed at consolidation of 'course content'</td>
<td>30%'</td>
<td>N</td>
<td>1,2,3,4,5</td>
<td>Project</td>
</tr>
<tr>
<td>Test:</td>
<td>Tests will demonstrate relevant underpinning knowledge gained and provide consolidation across the content range</td>
<td>40%'</td>
<td>N</td>
<td>1,2,3,4,5</td>
<td>Examination (unseen)</td>
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</tbody>
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