<table>
<thead>
<tr>
<th>Course Title</th>
<th>Experimental and Statistical Analysis</th>
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<tbody>
<tr>
<td>Course Code</td>
<td>MME105</td>
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<tr>
<td>Course Purpose and Objectives</td>
<td>This experimental course aims to introduce the students to basic experimental techniques employed for the determination of physical parameters, to the statistical analysis of experimental data, graphical methods for data presentation and to the preparation of laboratory reports.</td>
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| Course Content               | - Introduction in Experimental and Statistical Analysis (error sources, error theory, significant digits, propagation error, introduction in the construction of plots, least square method).  
- Laboratory Exercises:  
  Π1: Law of conservation of linear momentum (Newton’s 2\textsuperscript{nd} Law)  
  Π2: Determination of gravitational acceleration (g) using a simple pendulum  
  Π3: Equation of state/constitutive equation – Hooke’s Law  
  Π4: Conservation of Energy: Torque – Work  
  Π5: Torque of Parallel and non-parallel forces  
  Π6: Moment of inertia  
  Π7: Determination of friction coefficient  
  Π8: Thermal expansion  
  Π9: Specific heat capacity  
  Π10: Boyle’s Law  
  Π11: Charles’ law  
  Π12: Determination of viscosity |
| Learning Outcomes            | - Accurate performance of laboratory experiments and correct acquisition of experimental data  
- Understanding of the significance of complying with health and safety regulations in laboratories.  
- Understanding the meaning of “accuracy” and “precision” in experimental measurements  
- Performance of a quality test (Q-test) for the identification and rejection of “suspect” experimental values.  
- Understanding rounding and significant digits  
- Understanding on the main sources and categories of experimental errors  
- Ability to perform statistical analysis and evaluation on experimental data  
- Understanding of error propagation and solving related problems.  
- Ability to generate plots from experimental data.  
- Ability for processing primary experimental data in order to obtain linear plots.  
- Understanding and use of the least square method  
- Skill development on the evaluation of the quality of an experiment.  
- Preparation of well-structured written laboratory reports.  
- Use of excel software in analyzing experimental data and constructing plots. |