Course Synopses:

<table>
<tr><td>Course Code</td><td colspan="5">ADU4301</td></tr>
<tr><td>Course Title</td><td colspan="5">Newtonian Mechanics I</td></tr>
<tr><td>Credit value</td><td colspan="5">3</td></tr>
<tr><td>Core/Optional</td><td colspan="5">Core</td></tr>
<tr><td>Prerequisites</td><td colspan="5">ADU3302 (Pass/valid OCAM/CR)</td></tr>
<tr><td>Hourly breakdown</td><td colspan="2">Theory</td><td>Practical hours</td><td>Independent Learning</td><td>Assessments</td><td>Total hrs</td></tr>
<tr><td></td><td>Sessionsx2 =25x2 = 50hrs</td><td>DS hrs=4x3=12 hrs</td><td>-</td><td>▪ Sessions x3 =25x3=75hrs
▪ Online /Audio-visual materials and other learning resources-11 hrs</td><td>▪ Continuous Assessments (CA) -2hrs</td><td>150hrs</td></tr>
<tr><td>Course Aim/s.</td><td colspan="5">This course aims at introducing students to the basic concepts and results in Newtonian Mechanics along with their applications and will provide the pre-requisite knowledge for those aspiring to follow the course Newtonian Mechanics II.</td></tr>
<tr><td>PLOs addressed by course</td><td colspan="5">• PLO1: Knowledge: Explain the fundamental, principles and broader knowledge pertaining to the chosen science disciplines offered for the BSc degree.
• PLO3: Communication: Communicate reliably, efficiently and effectively to present information, ideas and concepts to the scientific community as well as to the wider society.
• PLO5: Creativity and Problem Solving: Identify problems and argue out and analyze such problems using qualitative and/or quantitative practical approaches in scientific methodology to provide valid conclusions
• PLO8: Vision for Life: Identify where one wants to be and develop long term goals maintaining competency to conduct scientific investigations and proceed to undertake further studies.
• PLO9: Lifelong Learning: Foresee new trends and recognize their impact, and update knowledge and develop new skills to meet future changes and challenges.</td></tr>
<tr><td>Course Learning Outcomes (CLO)</td><td colspan="5">After successful completion of this course, students should be able to:
● CLO1: describe the motion of a particle moving in one dimension.(PLO 1,3,5)
● CLO2: describe the motion of a particle moving along a plane curve using intrinsic coordinates (PLO 1,3,5)
● CLO3: describe the motion of a particle moving on a plane using plane polar coordinates. (PLO 1,3,5,8,9)
● CLO4: describe the motion of a particle moving under a central force (PLO 1,3, 5,8,9)
● CLO5: derive the differential equation of the central orbit using reciprocal coordinates (PLO 1,3, 5,8,9)
● CLO6: use Kepler's laws and Newton's law of gravitation to explain planetary motion. (PLO 1,3, 5,8,9)
● CLO7: derive the equation of motion of a body in which matter being emitted or added to the system. (PLO 1,3, 5,8,9)
● CLO8: explain the motion of a rigid body rotating about a fixed axis using conservation of energy. (PLO 1,3, 5,8,9)
● CLO9: explain the impulsive motion of a rigid body using conservation of angular momentum (PLO 1,3, 5,8,9)</td></tr>
<tr><td>Content (Main topics, sub topics)</td><td colspan="5">Description of motion; laws of motion; motion in one dimension; curvilinear motion in intrinsic coordinates; curvilinear motion on a plane using polar coordinates; motion in three dimension; motion of a particle under a central force; law of Gravitation; motion under gravitational attraction: energy in orbits; motion of a system of particles; modeling the motion of a rocket; moment of inertia of a rigid body; angular momentum of a rigid body; rotation about a fixed axis; Rolling and sliding motion.</td></tr>
<tr><td>Teaching Learning methods (TL)</td><td colspan="5">• Self-Learning/Independent learning of Self-study
  • Instructional Material (IL)
  • Online Activities (OL)
  • Reference Work (RE)
• Compulsory contact sessions
  • Assessments (AS) and Feedback – MCQs (MCQ);Structured Essay (SEQ); Essay Questions (ES);
• Non-compulsory contact sessions
  • Day Schools (DS)</td></tr>
<tr><td>Assessment strategy</td><td colspan="3">Overall Continuous Assessment Mark (OCAM):</td><td colspan="2">Final Assessment (FA):</td></tr>
<tr><td></td><td colspan="3">Details: Continuous Assessment1 (CAT1): -1hr
Continuous Assessment2 (CAT2): -1hr
OCAM=60%Maximum(CAT1, CAT2) +
40%Minimum(CAT1, CAT2)</td><td colspan="2">Final Evaluation -Theory: 100%-2hrs</td></tr>
<tr><td></td><td colspan="5">Overall Mark (OM)
If $FA \geq 40$ then $OM = 0.4 \times OCAM + 0.6 \times FA$.
If $30 \leq FA < 40$ then $OM = 0.4 \times OCAM + 0.6 \times FA$, subject to a maximum of 40
If $FA < 30$ then $OM = FA$</td></tr>
<tr><td>Recommended Readings:</td><td colspan="5">1. Text Book of Dyanamics By Frank Chorlton
2. Introduction to Classical Mechanics by David Morin
3. Dynamics of a Particle & of Rigid Bodies by S. L. Loney</td></tr>
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