

Module Title:	Mechanics of Machines 2
Language of Instruction:	English
Credits:	10
NFQ Level:	6
Module Delivered In	No Programmes
Teaching & Learning Strategies:	The module will be delivered using lectures, tutorials and laboratory sessions to illustrate the concepts under study.
Module Aim:	• To provide the student with a broad knowledge of the external effects of forces applied to particles, as evidenced by the change of motion produced. • To provide the student with a broad knowledge of the internal effects of forces applied to members in structures and mechanisms, as evidenced by the stresses and deformations produced. • To provide the student with a foundation for subsequent modules in Mechanics of Machines and other related modules.

Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Apply and solve formulae involving the interaction of the motion of an object and the forces and torques to which it is subjected;
LO2	Apply and solve formulae involving the concepts of direct stress and Modulus of Elasticity, shear stress and Modulus of Rigidity and their applications such as torsion in solid and hollow shafts and in belt drives and couplings.
LO3	Apply and solve formulae to determine the shear force and bending moment distributions resulting from the loading of a structural element such as a simply-supported beam or cantilever ;
LO4	Apply and solve formulae to determine the forces in the individual members of a loaded truss or framework;
LO5	Contribute effectively, as an individual and as part of a group, to the planning and realization of investigations in a laboratory environment into the effects of applied forces on components.

Pre-requisite learning
Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>
No recommendations listed
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>
No incompatible modules listed
Co-requisite Modules
No Co-requisite modules listed
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>
No requirements listed

Module Content & Assessment

Indicative Content

• Review of Motion of a particle o Equations of linear motion – velocity and acceleration; o Equations of angular motion – angular velocity and angular acceleration;
• Motion in two dimensions o Motion of a projectile – range on a horizontal and inclined plane; maximum height.
• Inertia and Change of Motion o Newton's laws of motion – application to particles; o Application to connected objects
• Motion in a Circle o Centripetal force, centrifugal force, o Applications - Centrifugal clutch
• Dynamics of Rotation o Torque and angular acceleration; o Moment of inertia, radius of gyration, o Relationship between linear and angular motion – the hoist; o Kinetic energy of rotation, function of a flywheel
• Shear and Torsion o Review of direct stress and direct strain; Modulus of elasticity, Application to compound sections. o Shear stress and shear strain; Modulus of Rigidity. o Torsion in solid and hollow shafts: Relationship between torque, shear stress, polar second moment of area, angle of twist. o Drive shaft configurations, cardinal shafts, balancing effect and coupling arrangements. Power Transmission.
• Belt Drives & Couplings o Flat Belts, angle of lap, frictional effects, belt tensions. o Vee Belt, effects of centrifugal tension, optimum velocity. o Belt configuration o Couplings: Standard pin couplings, calculations and detailing; Shear pins and mechanical overload devices. o Fluid couplings
• Shear Force and Bending Moment in beams o Shear force and bending moment distributions; o Simply supported beams; o Cantilevers; o Concentrated loading; o Uniformly distributed loading.
• Frameworks o Determine the force induced in the individual members of a loaded frame by either the Method of Joints or the Method of Sections.

Assessment Breakdown	%
Continuous Assessment	20.00%
Practical	20.00%
End of Module Formal Examination	60.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Other	Students will be expected to sit a number of individual written assessments throughout the academic year, typically at the conclusion of one or more learning outcomes	1,2,3,4	20.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Students will carry out six different laboratory sessions throughout the academic year and will produce written reports describing each one. Students will be assigned to groups for the execution of the laboratory practical work but reports must be submitted on an individual basis	1,3,4,5	20.00	Sem 1 End

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	A final written examination will assess the extent to which the student has achieved the module learning outcomes	1,2,3,4	60.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Every Week	3.00
Laboratory	Every Week	1.00
Estimated Learner Hours	Every Week	3.00
Total Hours		7.00

