Liverpool John Moores University

Title:	MECHANICAL PRINCIPLES
Status:	Definitive
Code:	**4514NCCG** (129433)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	Nelson Campus

Team	Leader
Christian Matthews	Y

Academic Level:	FHEQ4	**Credit Value:**	20	**Total Delivered Hours:**	60
Total Learning Hours:	200	**Private Study:**	140		

Delivery Options
Course typically offered: S1, S2, Sum, NS2 (S2 for Jan)

Component	Contact Hours
Lecture	60

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	Test	Online Test	50	
Report	Assignment	Assignment	50	

Aims

The aim of this module is to introduce students to the essential mechanical principles associated with engineering applications. Topics included in this module are: behavioural characteristics of static, dynamic and oscillating engineering systems including shear forces, bending moments, torsion, linear and angular acceleration, conservation of energy and vibrating systems; and the movement and transfer of energy by considering parameters of mechanical power transmission systems. On successful completion of this module students will be able to explain the underlying principles, requirements and limitations of mechanical systems

Learning Outcomes

After completing the module the student should be able to:

1 Identify solutions to problems within static mechanical systems.
2 Illustrate the effects that constraints have on the performance of a dynamic mechanical system.
3 Investigate elements of simple mechanical power transmission systems.
4 Analyse natural and damped vibrations within translational and rotational mass-spring systems.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Online Test	1	2
Assignment	3	4

Outline Syllabus

Shafts and beams: shear forces on beams, bending moments and stress due to bending in beams, selection of appropriate beams and columns to satisfy given specifications, theory of torsion in solid and hollow circular shafts
Energy and work: conservation of energy and work-energy transfer in systems, linear and angular velocity and acceleration, velocity and acceleration diagrams of planar mechanisms, gyroscopic motion
Couplings and energy storage: universal couplings and conditions for constant-velocity, importance of energy storage elements and their applications
Types of motion: simple harmonic motion, natural frequency of vibration in mass-spring systems
Damped systems: frequency of damped vibrations in mass-spring-damper systems, conditions for an external force to produce resonance

Learning Activities

Lectures
These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.
The material of this module requires the development of significant practical skill. This will be taught within the lecture time, making these sessions a blend of lecture and workshop time. The sessions will be timetabled in spaces with physical resources appropriate to the delivered content.
Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to provide early informal feedback on their progress.

Independent Study
Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance their academic work and enable valid contribution to lectures and seminars.

VLE support
This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

Notes

-