Liverpool John Moores University

Title:	Product Analysis
Status:	Definitive
Code:	**5005PDE** (120086)
Version Start Date:	01-08-2019
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
Jamie Finlay	Y

Academic Level:	FHEQ5	**Credit Value:**	20	**Total Delivered Hours:**	72
Total Learning Hours:	200	**Private Study:**	128		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	24
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	Class test	In-class dynamic analysis test	40	
Report	Report	Structural analysis report	60	

Aims

Provide students with knowledge and experience relating to the analysis of products which incorporate elements of static and dynamic functionality.

Learning Outcomes

After completing the module the student should be able to:

1	Apply the principles of mechanics to analyse the behaviour and performance of a mechanism or device
2	Undertake a motion analysis to solve mechanical and kinematic problems
3	Undertake a finite element analysis to investigate the structural integrity of product component(s)

Learning Outcomes of Assessments

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

In-class dynamic analysis test	1	2
Structural analysis report	3	

Outline Syllabus

Module introduction
Module guide; aims; learning outcomes; assessment and marking schemes. Outline syllabus; module timetable and student feedback.

Mechanisms:
Commonly used and ingenious mechanisms. For example, crank- sliders, quick return mechanisms, linkages, cams, gears and gear trains and specialised mechanisms. Motors and motor selection.

Dynamic Analysis:
Graphical techniques for analysis of displacements, velocities, accelerations, force and torque relationships. Identifying and calculating system inputs and outputs. Measuring forces and torques. Use of solid modelling, animation and simulation to aid design. Qualitative description of the effects of forcing and damping.

Finite element analysis for design:
Modelling strategy. Planning the analysis. Analysis types, static, modal. Loading, point loads, stress singularities, pressure loading, examples. Boundary conditions, use of symmetry, balanced loading and minimum constraint, avoidance of free body motion, problems associated with inappropriate boundary conditions, basic contact in assemblies, examples. Choice of element, mesh controls and mesh density, convergence of results, problems with element distortion, adaptive meshing. Managing the solution, types of solver, analysis of errors and warnings. Post processing and results checking. Review of available results, stress, strain, displacement, primary and derived quantities etc. Interpretation of results, checking results, reaction forces, displaced shape, nodal and element plots, hand calculations. Design against yielding in materials and factors of safety.

Learning Activities

This module will be delivered through an integrated series of lectures, tutorials, practical sessions, guided design activities and case studies. The learning activities are to be student focused and develop the students design knowledge through experiential learning.

Notes

This module is delivered using a variety methods including lectures, seminars, tutorials and practical sessions. The module will be delivered from a engineering and product design perspective.