MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME105 MECHANICAL ENGINEERING DESIGN

Module Registrar: Dr Yevgen Gorash yevgen.gorash@strath.ac.uk	**Taught To (Course): Cohorts for whom class is compulsory**		
Other Lecturers Involved: Mr Drew Irvine Mr Lewis McFadden	**Credit Weighting: 20**	**Semester: 1 and 2**	
Assumed Prerequisites: none	**Compulsory class**	**Academic Level: 1**	**Suitable for Exchange: N**

Module Format and Delivery (HOURS i.e. 1 credit = 10hrs of study):

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
	22	22	70		4		10	72	200

Educational Aim

This module aims to place the essential elements of design at the heart of courses for Mechanical Engineering students. It shows how the disparate elements of engineering science may be brought together and used to create a safe, durable and cost-effective solution to a perceived engineering need using 3D solid modelling and computer-aided manufacturing.

Learning Outcomes

On completion of the module the student is expected to be able to:

LO1 Appreciate and use a range of modern manufacturing techniques, including hand tools.

LO2 Appreciate the importance of materials selection as a fundamental aspect of the design process.

LO3 Understand the importance of team working and cooperative learning while completing complex tasks.

LO4 Appreciation of formal design methods and standards, and the use of sketching, 3D solid modelling and drawing as an essential component of communication and product development cycle.

LO5 Appreciation of modern CAD-CAM techniques and software.

Syllabus

The module will teach the following:

a) Students will create a remote control (RC) mechanism using a range of manufacturing techniques and develop an appreciation of hand and machine tools for manufacturing and assembly.

b) Students will learn the basics of team work while creating a remote control (RC) mechanism in the first semester and while re-designing this mechanism in the second semester using computer-aided tools.

c) An introduction to Engineering Communication, including engineering drawings and their place within the wider context of the manufacturing process.

d) Students will learn/ develop presentation skills presenting the results of their team work on a remote control (RC) mechanism.

e) An introduction to the Design Process through sketching, 3D solid modelling and assembling using CAD software.

f) An introduction to CAD-CAM techniques and basic techniques in the use of specialised software.

g) Students will learn the basics of engineering report writing while working together on the group coursework report.

Assessment of Learning Outcomes

Criteria

For each of the Module Learning Outcomes the following criteria will be used to make judgements on student learning:

LO1
C1 Students should be able to use a range of hand tools to create and assemble artefacts.
C2 Students should have an appreciation of the use of machine tools in the manufacturing process.

LO2
C1 Students should describe the structure and processing of the materials observed.
C2 Students should relate structure and processing to materials properties including cost.
C3 Students should relate structure, processing and properties to the service conditions of the component.

LO3
C1 Students should complete tasks in teams while completing complex tasks.
C2 Students should cooperate to produce joint outputs that combine the efforts of each team member.

LO4
C1 Students should be able to communicate their design ideas using graphical communication skills.
C2 Students should have an understanding of basic requirements and standards for Engineering Design.

LO5
C1 Students should have a basic working knowledge of CAD & CAM software and modelling approaches.
C2 Students should understand the benefits of CAD-CAM techniques in modern manufacture.

The standards set for each criterion per Module Learning Outcome to achieve a pass grade are indicated on the assessment sheet for all assessment.

Principles of Assessment and Feedback
(within Assessment and Feedback Policy at: https://www.strath.ac.uk/professionalservices/staff/policies/academic/)

Deliver high quality feedback information that helps learners self-correct: High quality feedback will be provided by staff to students in groups at all stages of their work. This will involve group discussions, presentation review sessions and feedback on project work.

Ensure that summative assessment has a positive impact on learning: Summative assessments by presentations written reporting will include detailed feedback on an individual and group basis.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams *(individual weightings)*

Examination				**Coursework**		**Practical**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***
				s2: 1	50%	s1: 1 (comprised of Presentation 35% and Online Quiz 15%)	50%
*				* LO3, LO4, LO5		* LO1, LO2, LO3	

* ***L/Os:*** *Indicate which Learning Outcomes (L01, L02, etc) are to be assessed by exam/coursework/project/practical as required.*

Coursework / Submissions deadlines (*academic weeks*):
To be advised – might be different for each student group based on lab timetable.

Resit Assessment Procedures:
Submission of alternate ^^project(s) prior to commencement of the July/August exam diet.

^^Students must contact the module Registrar for details as soon as results confirm that a resit is required.

PLEASE NOTE:
Students must gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-assessed during the July/August exam diet. This re-assessment will consist entirely of coursework. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

*****Essential** ****Highly recommended reading** ***For reference/further reading**

*** "Manufacturing Engineering and Technology", 7th Edition [internet resource] by S. Kalpakjian, Pearson, 2021, ISBN 9781292372891. Full online access via the Library website: https://www.vlebooks.com/Product/Index/2151913

*** "Learn SOLIDWORKS: Get up to speed with key concepts and tools to become an accomplished SOLIDWORKS Associate and Professional", 2nd Edition [internet resource] by Tayseer Almattar, Packt Publishing, 2022, ISBN: 9781801074339. Full online access via the Library website: https://app.knovel.com/kn/resources/kpLSOLID03/toc?kpromoter=marc

** BS 8888:2020 "Technical product documentation and specification", British Standards Online. Can be downloaded free on DS using the following link: https://bsol-bsigroup-com.proxy.lib.strath.ac.uk/Home

* "Materials Science and Engineering: an Introduction" by Wm D Callister, John Wiley & Sons, Copies in the Main Library.

* "Mastering Manufacturing" by Gordon Mair, Macmillan, 1993, ISBN 0333542304. Copies available in Main Library.

* "Materials and Processes in Manufacturing" by E.P. DeGarmo, Macmillan, 1984, ISBN 0029-401405. Copies in Main Library.

Additional Student Feedback

(Please specify details of when additional feedback will be provided)

Date	Time	Room No
Depending on group's schedule of activities.		Check timetable webpages for details

Students receive regular feedback through discussion with staff during group activities throughout the year. Students will receive grades and written feedback on their presentation and coursework. Written feedback will be provided for the Design project element of assessment. All aspects of the course involve verbal feedback, in the context of group discussions with supervising staff.

Session: 2024/25

Approved:

Programme Lead/Director Signature: Dr G Houston-Scott

Date of Last Modifications: 05/08/2024

(MAE template updated July 2024)

MODULE TIMETABLE

Module Code:	**ME105**	**Module Title:**	**MECHANICAL ENGINEERING DESIGN**

Brief Description of Assessment: ME105 is assessed in both semesters, weighted at 50% each.

Sem 1 – Buggy design & manufacturing: Each assigned lab team (4-5 students) will attend weekly laboratories to design and manufacture a RC buggy. In week 11 all groups will attend a Buggy Demonstration / Race. Each individual student should complete an Online Quiz (15%) in Week 11 to confirm the knowledge of manufacturing techniques that were studied during the Buggy class and practical work in the workshops.
Each team will then produce a Presentation (35%) on the design and manufacture of their RC buggy to present in Week 0 of Semester 2.

Sem 2 – Each assigned lab team (4-5 students) will produce a coursework (50%) focussed on computer-aided comprehensive re-design of an RC buggy that will consider a contribution of each individual student on the stage of concept design development and selection.

Assessment Timing

Indicated on the table below are the start/submission dates for each assignment/project and the timing of each exam/assessment.

Please note: Timings could change during unforeseen periods of disruption; this should only be used as a guide.

Semester One	W&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Choose an item. Choose an item.	Project Set	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Project Submission	Buggy Demonstration (Race) Online Test	Choose an item.

Semester Two	C&D Wk	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9	WK10	WK11	Exam Period
	Presentation	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item.	Coursework Set	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Choose an item. Choose an item.	Coursework Submit	Choose an item.