

MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME214 MECHANICAL ENGINEERING DESIGN 2

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|--|---|--------------------------|---------------------------------|
| Module Registrar: Dr Emma Henderson e.henderson@strath.ac.uk | Taught To (Course): Cohorts for whom class is compulsory | | |
| Other Lecturers Involved: Dr S Connolly stephen.connolly@strath.ac.uk | Credit Weighting: 10 (ECTS 5) | Semester: 1 and 2 | |
| Assumed Prerequisites: ME105 or ME109 (BME students) | Compulsory class | Academic Level: 2 | 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 |
|---------|----------|------------------|-----------|----------|--------|---------|-------------|---------------|-------|
| | | S1: 12 S2: 10 | | | 4 | | | 74 | 100 |

Educational Aim

This module aims to:

- Develop competency using the Solidworks software suite, building on the competencies developed in ME105 and leading to certification to Industry Standard.
- Consolidate the understanding of the requirements, development and adherence to International Standards with regards engineering drawings.
- Apply materials selection software to compare and analyse the choice of materials in engineering design

Learning Outcomes

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

- LO1. Have an increased depth of knowledge and skills in the use of the modern features-based 3D modeller.
- LO2. Use a modern features-based 3D modeller to create assemblies.
- LO3. Use materials selection procedures and material selection software to make rational choices on the basis of engineering, considering manufacturing techniques and other parameters affecting the final costs of products.

Syllabus

The module will teach the following:

Advanced Modelling practises

- Development of a functional understanding of 3D modelling practises within the Solidworks platform.
- Understand the importance of, and adhere to, International standards for drawings.
- Creation of parts and assemblies within Solidworks.

Material selection for engineering design

- Understand the classifications and the vocabulary to describe materials and their properties.
- Utilise a design process for materials selection to identify, compare and analyse appropriate materials.
- Implement the stages of a materials selection design process in Granta EduPack software.

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 Develop a modelling strategy and Design Intent to create appropriate models suitable for utilisation in engineering drawings.

C2 Have sufficient functional knowledge of the programme as demonstrated with industry recognised certification.

C3 Demonstrate sound engineering judgement and effective communication skills.

LO2

C1 Develop a modelling strategy (highlighting assumptions) and select appropriate idealisations which are compatible with the objectives of the animation being undertaken.

C2 Demonstrate sound engineering judgement and effective communication skills.

LO3

C1: Identify the material properties associated with specific mechanical or environmental conditions

C2: Examine existing parts or interpret a design brief to relate material properties to prescribed operating conditions

C3: Apply the stages of the material selection process for a new or existing part to reveal candidate materials

C4: Use materials selection software to manipulate a library of materials, graphically analyse and communicate the material selection process

C5: Analyse and contrast candidate material choices in a real world case study

C6: Recommend materials for a design problem with additional consideration of processing, sustainability, and other parameters affecting final costs of products

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/>)

Advanced Modelling Practices:

This course works in a 'Lectorial' format, using short 'teaching' bursts interspersed with assisted lab based tutorials/clinics (on campus or online). This gives the students an opportunity to learn the software by working through weekly exercises and assignments with the support of experienced lab tutors. Students are encouraged to work in small groups either in person or virtually through forums to understand and solve basic engineering problems, allowing feedback both from other students and staff and the ability to learn from the mistakes and successes of others.

There are timetabled support sessions (on campus or virtually) where students have ample opportunity for feedback on progression. Students can also ask for feedback between sessions on the class forums.

The significant laboratory content also provides students with the opportunity to develop and practice the required competences before summative assessment takes place.

Students are encouraged to provide feedback to module staff through weekly feedback forms. Additional support materials are developed throughout the module to improve students' understanding.

Staff involved in this subject reflect on the module delivery each year and share their own experiences with a view to updating the module and improvement of the student learning experience.

Materials Selection

The lecture content for this part of the module uses a flipped classroom approach. The class content is taught through short online lectures watched by students prior to tutorials. The scheduled tutorials are used to provide demonstrations of solving materials selection problems and hands-on experience of Granta EduPack materials selection software. They provide further opportunity for students to give and receive informal feedback and ask questions about lecture content, tutorials, and coursework.

Additional formative feedback is enabled and encouraged through students' participation in ungraded myplace quizzes.

A coursework is used to assess each student's learning of this module component. Formal feedback is given by way of the return of marks and additional comments

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

| Examination | | | | Coursework | | Practical | | Project | |
|-------------|----------|----------|------------------|--|------------------|-----------|------------------|---------|------------------|
| Number | Month(s) | Duration | <i>Weighting</i> | Number | <i>Weighting</i> | Number | <i>Weighting</i> | Number | <i>Weighting</i> |
| 1 | May | 3 hours | 70% | EduPack Myplace submission (sem2) | 30% | | | | |
| * LO1, LO2 | | | | * LO3 | | * | | * | |

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

Coursework / Submissions deadlines (*academic weeks*):

EduPack coursework, semester 2, week 5

Resit Assessment Procedures:

2 hour examination in August diet.

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 August diet. This re-assessment will consist entirely of examination. No marks from any previous attempts will be transferred to a new resit attempt.

Recommended Reading

***Purchase recommended **Highly recommended reading *For reference

** Materials Selection in Mechanical Design, 4th Ed, Michael Ashby, Butterworth-Heinemann, ISBN-10: 1856176630, 2010.

* Official Guide to Certified SOLIDWORKS Associate Exams: CSWA, CSWA-SD, CSWSA-FEA, CSWA-AM, SDC Publications, ISBN: 978-1-63057-232-7, 2018.

Additional Student Feedback

| Date | Time | Room No |
|-----------------|-----------------------------------|--------------------------------------|
| Weekly tutorial | TBC- class split between labs. | Check timetable webpages for details |

Assessment of this class is by an Examination during 2nd semester exam diet (70%) and through a materials selection coursework (30%).

Informal feedback will be given on the tutorial based assignment during lab time. Due to the nature of the certified examinations, specific feedback on questions will not be available however lecturing staff will discuss general results as far as is possible and be happy to provide discussion and feedback on the tests per any queries the students have.

Students will receive continuous formative feedback through the weekly tutorial sessions and should make full use of these opportunities.

Session: 2021/22

Approved:

Course Director Signature: Stuart Grey (Outgoing Undergraduate Course Director)

Date of Last Modifications: September 13, 2021

MODULE TIMETABLE

Module Code:

ME214

Module Title:

Mechanical Engineering Design 2

Brief Description of Assessment:

1 x semester 2 Certified SolidWorks Associate (CSWA) examination (May exam period)
 1 x coursework submission on Materials selection using Granta EduPack.

Assessment Timing:-

Please note: Timings can and will change, 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 |
|--------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|-----------------|
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| Semester Two | C&D Wk | WK1 | WK2 | WK3 | WK4 | WK5 | WK6 | WK7 | WK8 | WK9 | WK10 | WK11 | Exam Period |
|--------------|------------------------------------|------------------------------------|------------------------------------|-----------------|------------------------------------|--------------------|------------------------------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-------------|
| | Choose an item. Choose an item. | Choose an item. Choose an item. | Choose an item. Choose an item. | Course work Set | Choose an item. Choose an item. | Course work Submit | 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. | Exam |