Module Description Form

16429  CAED

Module Registrar: Dr J Wood  j.wood@strath.ac.uk

Taught To (Course): Cohorts for whom class is compulsory / optional / elective

Other Lecturers Involved: Dr T Comlekci, Dr Y Zhang

Credit Weighting: 20 (ECTS 10)

Semester: 1 & 2

Assumed Prerequisites: Computer literacy; students should have completed Engineering Analysis III (16363) or equivalent.

Compulsory/optional/elective class

Academic Level: 4

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

<table>
<thead>
<tr>
<th>Lecture</th>
<th>Tutorial</th>
<th>Laboratory</th>
<th>Groupwork</th>
<th>External</th>
<th>Online</th>
<th>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
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<tbody>
<tr>
<td>30</td>
<td></td>
<td>48</td>
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<td>12</td>
<td>30</td>
<td>80</td>
<td>200</td>
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Delivery varies across the 3 sections of the course. NB: Students should attend computing laboratories for support as the need arises.

Educational Aim

This module aims to provide an appreciation of computer aided design, analysis and simulation methods over a range of engineering problems and to provide practical experience of the use of industry standard engineering simulation and analysis software to design and investigate the behaviour and performance of specific systems or components.

Learning Outcomes

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

LO1 use a modern features-based modelling system effectively for the purposes of designing parts and assemblies and employ this geometry as the basis for analysis and simulation using an integrated analysis system.

LO2 employ a finite element system effectively for the design of components and systems for linear and non-linear stress analysis and heat transfer.

LO3 employ computational fluid dynamics (CFD) software effectively to real-world engineering problems.

Syllabus

The module will teach the following:

Section 1
Introduction to geometric modelling technology and associated computational geometry. A study of data exchange issues related to analysis and simulation. An examination of rapid prototyping and rapid tooling. An overview of sensitivity studies and shape optimisation using an integrated analysis system. An insight into the analysis and simulation of plastic and composite components.

Section 2

Section 3
Analyse, using CFD, an external turbulent flow and provide hand-written validation data to support the numerical solution.
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 Describe the software tools being used, highlighting their advantages and disadvantages.
C2 Develop a modelling strategy (highlighting assumptions) and select appropriate idealisations which are compatible with the objectives of the analysis and simulation being undertaken.
C3 Employ an analysis and simulation system to achieve the objectives of the task set and to validate the results obtained as far as practical.
C4 Demonstrate sound engineering judgement and effective communication skills.

LO2
C1 Describe the software tools being used, highlighting their advantages and disadvantages.
C2 Develop a modelling strategy (highlighting assumptions) and select appropriate idealisations which are compatible with the objectives of the analysis and simulation being undertaken.
C3 Employ an analysis and simulation system to achieve the objectives of the task set and to validate the results obtained as far as practical.
C4 Demonstrate sound engineering judgement and effective communication skills.

LO3
C1 Describe the software tools being used, highlighting their advantages and disadvantages.
C2 Develop a modelling strategy (highlighting assumptions) and select appropriate idealisations which are compatible with the objectives of the analysis and simulation being undertaken.
C3 Employ an analysis and simulation system to achieve the objectives of the task set and to validate the results obtained as far as practical.
C4 Demonstrate sound engineering judgement and effective communication skills.

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

12 Principles of Assessment and Feedback
(on Learning & Teaching web pages: www.strath.ac.uk/learnteach/teaching/staff/assessfeedback/12principles/)

Students are provided with marking schedules which provide an indication of marks assigned and performance required and the marking schedule also provides an indication of the challenges and where effort is best employed.

There are generally 4 hours of manned laboratory sessions per week and students who attend have ample opportunity for feedback on progression. In addition, on release of coursework marks, students have the opportunity to seek further feedback. Students therefore have the opportunity to improve over the 3 assessed elements.

The significant laboratory content also provides students with the opportunity to develop and practice the required competences before summative assessment takes place. All 3 sections of the course involve the application of analysis and simulation software and feedback from one section should lead to improved performance.

The essence of the laboratory element is interaction and dialogue and discussion amongst students is also encouraged and while no formal opportunities for self-assessment exist, students are encourage to reflect on their development during the laboratory element of the course.

Although there is a variation across the 3 course sections, students are generally engaged in the timing of assessment and also the topic in some cases. Marking schedules are also presented and discussed in some sections. While the assessment regime is laid down in the module descriptor, students are involved in the discussion and weightings of elements of the summative coursework in some sections of the course. Social integration during the learning process is much in evidence during the laboratory sessions.

The experience of using industry-leading application software on challenged and interesting problems (sometime of the student's own choosing) is generally found to be highly motivational and the achievement of competencies much in demand by industry can also improve self-esteem.

Staff involved in this subject hold a post-mortem each year and share their own experiences with a view to updating the module and improvement of the student learning experience.
Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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<tbody>
<tr>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
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L/Outcomes

| LO1-3 |

Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.

**Coursework / Submissions deadlines:**
To be notified by the class lecturer.

**Resit Assessment Procedures:**
Resubmission of new coursework(s) prior to the commencement of the August examination diet.
In some cases resubmission of the failed / non-submitted original coursework will be acceptable, in which case a brief oral examination may also be required.

**PLEASE NOTE:**
Students need to gain a summative mark of 40% to pass the module. Students who fail the module at the first attempt will be re-examined during the August diet. This re-examination will consist entirely of coursework / viva.

**Recommended Reading**
Course notes and self-learning material provided.

**Additional Student Feedback**
*(Please specify details of when additional feedback will be provided)*

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<th>Room No</th>
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Session: 2014/15

**Approved:**

**Course Director Signature:**

Date of Last Modifications: 28 August 2014
Brief Description of Assessment:

Three major coursework elements in the three distinct areas of the course, equally weighted.

Assessment Timing:-
Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment(s).

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<th>Semester One</th>
<th>WK1</th>
<th>WK2</th>
<th>WK3</th>
<th>WK4</th>
<th>WK5</th>
<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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<td>Submit CWK1</td>
<td>Start CWK2a</td>
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<th>WK10</th>
<th>WK11</th>
<th>WK12</th>
<th>Exam Period</th>
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<td>Submit CWK2b</td>
<td>Start CWK3</td>
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<td>Submit CWK3</td>
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