**MODULE DESCRIPTION FORM**

**ME923 GAS AND STEAM TURBINES**

**Module Registrar:** Dr I Taylor  
ian.taylor@strath.ac.uk

**Taught To (Course):** MSc. Power Plant Engineering

**Other Lecturers Involved:**  
Credit Weighting: 10

**Assumed Prerequisites:** None  
Optional

**Semester:** 2 (Dist Learn)

**Academic Level:** 5 / PG

### 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>Project</th>
<th>Assignments</th>
<th>Private Study</th>
<th>Total</th>
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<tbody>
<tr>
<td>40</td>
<td>60</td>
<td>100</td>
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### Educational Aim

This module aims to give students an advanced knowledge of applications of both steam and gas turbines within the power generation industry. The module includes details of power-plants that have been developed specifically to integrate gas turbines such as (gas turbine exhaust gas) heat recovery steam generators (HRSGs) used in combined cycle gas turbine (CCGT) plants. Also, aspects of gas and steam turbine design and operation are discussed. Key inputs will come from industry to ensure the course material is in line with current professional practice.

### Learning Outcomes

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

**LO1** Generate and modify simple numerical models to undertake design calculations that can be used to assess and interpret the predicted performance for a range of technologies.

**LO2** Write short technical reports that demonstrate an understanding of the main factors and design limitations that influence energy generation using turbo-machinery.

### Syllabus

The module will teach the following:

- Gas turbine design, including aero derivatives and industrial designs for power generation
- GT thermodynamics, including the Brayton cycle
- Simple (open) cycle and combined cycle configurations.
- Efficiency of CCGT plant, feedwater heating in the CCGT cycle
- HRSGs, including supplementary firing and once-through HRSGs,
- Fuel options, and dual pressure cycles
- Characteristics of CC steam turbines
- Condition monitoring and maintenance regimes
- Theory of gas and steam turbines
- Design of turbomachinery

### 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** Generate and modify simple numerical models to undertake design calculations that can be used to assess and interpret the predicted performance for a range of technologies.

- **C1** Submitted analysis/reports should include calculation details and limitations of the model, justification of design choices and discussion of the performance of the device.

**LO2** Write short technical reports that demonstrate an understanding of the main factors and design limitations
that influence energy generation using turbo-machinery,
C1 Marks for the submitted technical reports focus on interpretation and discussion of simulation results
C2 Report should contain evidence of justification and implications of choices made in design process and their
effect on performance.

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 encouraged to collaborate in the calculations and models provided in the tutorial exercise and
demonstration calculations provided during the course. However, it is emphasised that the analysis reports they
submit must be entirely their own work – background research plus results they have personally generated and
interpreted.

Detailed feedback is given, particularly on the initial tutorial exercises and assignments, to guide the students for
their final assignments.

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

<table>
<thead>
<tr>
<th>L/Outcomes</th>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Duration</td>
<td>Weighting</td>
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<tr>
<td>LO1 &amp; LO2</td>
<td>2</td>
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<td>50% each</td>
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Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.

Coursework / Submissions deadlines:
Open book exam will be released and the end of the course, to be handed in 3 weeks later.

Resit Assessment Procedures:
Resit open book exam (3 weeks duration) to be taken during August.

PLEASE NOTE:
Students need to gain a summative mark of 50% to pass the module. Students who fail the module at the
first attempt will be re-examined. This re-examination will consist entirely of exam.

Recommended Reading

- Combined-Cycle Gas and Steam Turbine Power Plants by Rolf Kehlhofer, Bert Rukes, Frank

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

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Session: 2014/15

Approved:

Course Director Signature: P Strachan

Date of Last Modifications: 28 August 2014
### Module Timetable

**Module Code:** ME923  
**Module Title:** Gas and Steam Turbines

### Brief Description of Assessment:

Coursework to be handed in 4 weeks after the course.

### Assessment Timing:

Indicate on the table below the Start/Submission dates for each Assignment/Project and the timing of each Exam/Class Test(s).

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<th>WK4</th>
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<th>WK6</th>
<th>WK7</th>
<th>WK8</th>
<th>WK9</th>
<th>WK10</th>
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