

MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME923 GAS AND STEAM TURBINES

Module Registrar: Dr I Kokkinakis ioannis.kokkinakis@strath.ac.uk	Taught To (Course): MSc Advanced Mechanical Engineering		
Other Lecturers Involved: None	Credit Weighting: 10	Semester: 2 (Dist Learn)	
Assumed Prerequisites: Level 4 UG Thermodynamics	Optional / Compulsory for MSc AME with PPT	Academic Level: 5	Suitable for Exchange: Y

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

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	Total
					10		40	50	100

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.

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.

Principles of Assessment and Feedback

(within Assessment and Feedback Policy at: <https://www.strath.ac.uk/staff/policies/academic/>)

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

Examination				Coursework		Practical		Project	
Number	Month(s)	Duration	Weighting	Number	Weighting	Number	Weighting	Number	Weighting
				2	50% each				
*				* LO1 & LO2		*		*	

* **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):

Coursework tasks will be released in Wks 2 and 8 with submission deadlines in Wks 5 and 11, respectively.

Resit Assessment Procedures:

Re-submission of coursework prior to the commencement of the August examination diet.

As soon as a student knows that they require a resit assessment for this class they should contact the class registrar to confirm these resit requirements and deadlines for this class.

PLEASE NOTE:

Students must gain a summative mark of 50% to pass the module. Students who fail the module at the first attempt will be re-assessed prior to the August 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

The following texts are recommended reading, relevant to this course, but are not essential purchases.

- Steam Turbines: Theory and Design by P. Shlyakhin ISBN 978-1410223487
- Combined-Cycle Gas and Steam Turbine Power Plants by Rolf Kehlhofer, Bert Rukes, Frank Hahnemann, & Franz Stirnimann ISBN 978-1593701680
- Combined Power Plants by John Horlock ISBN 978-1575241975
- Gas Turbine Theory by G.F.C. Rogers, H. Cohen & Paul Straznicky ISBN 978-0132224376

Additional Student Feedback

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

Date	Time	Room No
		Check timetable webpages for details

Session: 2019/20

Approved:

Course Director Signature: E Henderson
Date of Last Modifications: 11/09/2019

MODULE TIMETABLE

Module Code:

ME923

Module Title:

Gas and Steam Turbines

Brief Description of Assessment:

Two coursework reports

Assessment Timing:-

Indicate on the table below the start/submission dates for each assignment/project and the timing of each exam/assessment using the dropdowns provided. Dropdowns can be left blank. Add extra notes below the dropdowns.

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
	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.	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.

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 (CW1)	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Submit (CW1)	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Set (CW2)	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Submit (CW2)