MODULE DESCRIPTION FORM

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

ME923 GAS AND STEAM TURBINES- Online

Module Registrar: Dr W Dempster william.dempster@strath.ac.uk	**Taught To (Course): MSc Advanced Mechanical Engineering**	
Other Lecturers Involved:	**Credit Weighting:10**	**Semester:2 (online)**
Compulsory / optional class for MSc AME with PPT	**Academic Level: 5**	**Suitable for Exchange: Y**

Required prerequisites

Note: It is the responsibility of ALL students to ensure that they satisfy the prerequisite knowledge for this module BEFORE adding as part of curriculum selection. If unsure, please contact the Module Registrar or discuss with your Programme/Year Adviser of Studies.

Basic knowledge in Fluids/Thermodynamics consistent with a degree in Mechanical/Chemical or Aerospace Engineering. Specifically, Thermodynamic knowledge of the first and second law of thermodynamics for closed and open system, properties of fluids, thermodynamic processes and thermodynamic cycles associated with gas and vapour power systems and use of isentropic efficiencies Fluid Mechanic knowledge of continuity and momentum equation using finite control volume approaches for incompressible and compressible flow systems, including stagnation (total) conditions and isentropic flow analysis

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

Lecture	Tutorial	Laboratory	Groupwork	External	Online	Project	Assignments	Private Study	**Total**
					20		40	40	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 turbomachinery.

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
- 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:

C1 The ability to use thermodynamic models, calculate details correctly and understand limitations of the model.

C2 The ability to interpret and discuss the simulation results and present short technical reports

C3 The ability to justify the choices made in the design process and the related 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/professionalservices/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 the final assignments.

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

Examination				**Case Study Report**		**Practical**		**Peer Marking**	
Number	Month(s)	Duration	***Weighting***	Number	***Weighting***	Number	***Weighting***	Number	***Weighting***
				2	2 x 50%				
*				* LO1& LO2		*		*	

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

Coursework / Submission deadlines (*academic weeks*):
Coursework tasks will be released in wks 3 and 7, with submission deadlines in wks 6 and 11 respectively.

Resit Assessment Procedures:
Submission of alternate ^^coursework(s) prior to commencement of the 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 50% to pass the module. Students who fail the module at the first attempt will be re-assessed before the August diet. This re-assessment will consist entirely of a 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, FrankHahnemann, & 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
Feedback will be provided on request	To be arranged by email	N

Session:2023/24

Approved:

Course Director Signature: Olga Ganilova
Date of Last Modifications: 24/08/23

(Updated August 2023)

MODULE TIMETABLE

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

Brief Description of Assessment:

Two coursework reports.

Assessment Timing

Indicated on the table below are the start/submission dates for each assignment/project and the timing of each exam/assessment. Dropdowns may be left blank. Add extra notes below the dropdowns where relevant.

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.

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)	Course work Set (CW2)	None	Choose an item. Choose an item.	Choose an item. Choose an item.	Course work Submit (CW2)	Choose an item.