1. **Title of the module**

EENG6480 (EL648) Thermodynamics and Heat Transfer

1. **Division or partner institution which will be responsible for management of the module**

 Computing, Engineering and Mathematical Sciences

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

 Level 6

1. **The number of credits and the ECTS value which the module represents**

 15 credits (7.5 ECTS)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

 Term 2

1. **Prerequisite and co-requisite modules**

 EENG5190 (EL519) Introduction to Fluid Dynamics

1. **The courses to which the module contributes**

 BEng Mechanical Engineering

BEng Mechanical Engineering with a year in industry

1. **The intended subject specific learning outcomes.
On successfully completing the module students will:**
	1. Have knowledge and understanding of advanced thermodynamic concepts.
	2. Apply the first and second laws of thermodynamics to engineering problems.
	3. Understanding of the various mechanisms of heat transfer.
2. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**
	1. Deploy accurately established techniques of analysis and enquiry within a discipline;
	2. Communicate more effectively
	3. Critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), to make judgements,
	4. Show the ability to manage their own learning,
3. **A synopsis of the curriculum**

 The principles of thermodynamics; thermal properties; thermodynamic systems; 1st law and 2nd law of thermodynamics; heat transfer processes; perfect gases; steady flow energy equation; basics of conduction, convection and radiation; the principles of heat exchanger design and performance measurement; an introduction to computational thermo-dynamics.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

 Engineering Thermofluids: Thermodynamics, Fluid Mechanics, and Heat Transfer, Mahmoud Massoud, Springer, 2005.

Introduction to Thermodynamics and Heat Transfer. Yunus Cengel, McGraw-Hill. 2010

1. **Learning and teaching methods**

Total contact hours: 34
Private study hours: 116
Total study hours: 150

1. **Assessment methods**
	1. Main assessment methods

 Exam, 2 hours (70%)
Homework, 5 A4 pages (15%)
 Laboratory Report (5 pages) 15%

* 1. Reassessment methods

Like for like

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *9.1* | *9.2* | *9.3* | *9.4* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |
| **Private Study** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Labs* | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Example classes* | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Lectures* | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |
| *Lab Report* |  | **x**  | **x** | **x** | **x** |  | **x** |
| *Homework* |  | **x** | **x** | **x** | **x** | **x** | **x** |
| *Examination* | **x** | **x** | **x** | **x** |  | **x** | **x** |

1. **Inclusive module design**

The Division recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/ declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

Engineering is an international discipline with techniques developed and refined by scientists across the globe. Mastery of the subject-specific learning outcomes, will equip students to apply the theories and techniques of this module in a wide range of international contexts. Internationally recognised books are used as reading material for this course.

The module will use internationally developed and recognised notations and mathematical theories of thermodynamics and heat transfer. The module team includes many members of staff with international experience of teaching and research collaboration. In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material. The support provided to the students is also internationally attuned given our international student body.

**DIVISIONAL USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

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| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 15/12/2022 | Minor | 2022/2023 | 9, 11, 13, 14 | No |
|  |  |  |  |  |