**APPENDIX 4**

LOUGHBOROUGH UNIVERSITY

**Programme Specification**

*Aeronautical Engineering*

**Please note:** This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if full advantage is taken of the learning opportunities that are provided.

This specification should be read in conjunction with:

* [Regulation XX](http://www.lboro.ac.uk/governance/regulations/20/current/) for Undergraduate Awards
* [Module specifications](http://cisinfo.lboro.ac.uk/epublic/wp5015.main)
* The teaching, learning and assessment strategies used at Loughborough: URL
* What makes Loughborough University programmes and its graduates distinctive: URL

|  |  |
| --- | --- |
| Awarding body/institution; | Loughborough University |
| Teaching institution (if different); |  |
| Details of accreditation by a professional/statutory body; | The Royal Aeronautical SocietyInstitution of Mechanical Engineers |
| Name of the final award; | B.Eng/B.Eng + DIS |
| Programme title; | Aeronautical Engineering |
| Length of programme | Three years full time or 4 years if candidates undertake industrial training leading to the additional award of the Diploma in Industrial Studies which occurs between Parts B and C. |
| UCAS code; | H410/H401 |
| Date at which the programme specification was written or revised. | June 2008  |

**1. Programme Aims:**

To supply the aeronautical industries with graduates that have a thorough grounding in the aeronautical engineering disciplines, and the ability to apply their knowledge and skills effectively to engineering problems.

To provide a sound education in topics of relevance to aeronautical engineering via an understanding of selected engineering science topics and the application of fundamental principles to engineering analysis and the design and development of engineering products, sub-systems and systems.

To maintain programme content and coverage that is up-to-date and responsive to developments in Higher Education and industry and informed by department research activities.

To develop the students' sense of responsibility and competence by exposure to a range of experiences including aircraft related testing and design, opportunities for industrial training, group and individual project work.

To develop students skills in self learning, planning and communication.

To produce graduates with an appreciation of the economic, social and environmental aspects of Aeronautical Engineering.

To develop the students' ability to work successfully in a group, sometimes multi-disciplinary, on open-ended engineering problems.

To develop the students' commitment to life long learning and enthusiasm for the Aeronautical Engineering through the provision of exciting and challenging programme content.

**2. Relevant subject benchmark statements and other external and internal reference points used to inform programme outcomes:**

The following reference points were used in creating the programme specification: the Framework for Higher Education Qualifications (FHEQ); the Engineering subject benchmarks statement; the University Learning and Teaching Strategy; the EC (UK) Specification for Professional Engineering Competence (UK-SPEC); The Royal Aeronautical Society and the Institution of Mechanical Engineers Educational Base; our Industrial Advisory Committee.

**3. Programme Learning Outcomes**

**3.1 Knowledge and Understanding:**

*On successful completion of this programme, students should be able to* demonstrate knowledge and understanding of:

- a significant number of mathematical methods, and the limitations and areas of applicability

- appropriate, relevant physical scientific principles

- the role of IT and communications

- the design process and the appropriate design methodologies

- a broad range of engineering materials and components

- current business practices

- the professional responsibility of an engineer and the associated ethical issues

- current practices including the specific codes of practice relating to both the design process and the requirements for safe operation

- the capabilities/limitations of computational methods and the limitations of computer-based methods.

**3.2 Skills and other attributes:**

**a. Subject-specific cognitive skills:**

*On successful completion of this programme, students should be able to:*

- understand the essential principles of aeronautical engineering and the underpinning science and mathematics, with an appreciation of the wider engineering context and social, economic and environmental implications of the modern aerospace industry.

- understand the specific, relevant mathematical and scientific principles and methodologies and have the apply them in an aeronautical engineering context, often in a multidisciplinary study.

- understand the commercial aerospace processes, management techniques and legal requirements related to aircraft and the need for professional conduct.

**b. Subject-specific practical skills:**

*On successful completion of this programme, students should be able to:*

- demonstrate the practical engineering skills to carry out technical work in both laboratories and workshops, use standard design/analysis software, produce design work, work effectively in a group and individually on major aerospace related project work.

- apply key aeronautical engineering processes especially related to flight test data, use analytical methods, quantitative methods and relevant software and understand the systems approach to problem solving.

- apply relevant aerospace engineering skills, including an understanding of appropriate aviation codes of practice.

- apply quantitative technical tools and demonstrate the ability to provide novel solutions to aeronautical problems, particularly in the design of aircraft.

**c. Key/transferable skills:**

*On successful completion of this programme, students should be able to:*

- demonstrate skills in problem solving, communication, group working, use of general software and information retrieval, which act as a foundation life-long learning.

**4. Programme structure**

**Content**

**2.1** ***Part A - Introductory Modules***

2.1.1 ***Semester 1***

(i) COMPULSORY MODULES (total modular weight 55)

Code Title Modular Weight

MAA104 Engineering Mathematics 1 10

TTA003 Fluid Mechanics (10) 5

TTA005 Thermodynamics (10) 5

TTA014 Computing (10) 5

TTA104 Structures and Materials 10

TTA106 Aircraft Systems & Performance 10

TTA206 Introduction to Aircraft Design # (10) 5

TTA208 Manufacturing, Technology and Management # (10) 5

(ii) OPTIONAL MODULES (none)

2.1.2 ***Semester 2***

(i) COMPULSORY MODULES (total modular weight 65)

Code Title Modular Weight

MAA204 Engineering Mathematics 2 10

TTA001 Engineering Mechanics 10

TTA003 Fluid Mechanics (10) 5

TTA005 Thermodynamics (10) 5

TTA014 Computing (10) 5

TTA200 Risk Analysis 10

TTA201 Mechanics of Materials 10

TTA206 Introduction to Aircraft Design # (10) 5

TTA208 Manufacturing, Technology and Management # (10) 5

1. OPTIONAL MODULES (none)

**2.2** ***Part B - Degree Modules***

2.2.1 ***Semester 1***

(i) COMPULSORY MODULES (total modular weight 65)

Code Title Modular Weight

MAB104 Engineering Mathematics 3 10

TTB002 Dynamics 10

TTB100 Systems Reliability Assessment 10

TTB101 Low Speed Aerodynamics 10

TTB109 Aircraft Loading & Structural Airworthiness 10

TTB204 Mechanics of Solids 10

TTB208 Structural Design Project # (10) 5

(ii) OPTIONAL MODULES (none)

2.2.2 ***Semester 2***

(i) COMPULSORY MODULES (total modular weight 55)

Code Title Modular Weight

TTB201 High Speed Aerodynamics 10

TTB202 Control Engineering 10

TTB203 Turbomachinery & Propulsion 10

TTB208 Structural Design Project # (10) 5

TTB209 Aircraft Systems and Performance 2 10

ELB044 Electrotechnology 10

(ii) OPTIONAL MODULES (none)

**2.3** ***Part C - Degree Modules***

2.3.1 ***Semester 1***

(i) COMPULSORY MODULES (total modular weight 25)

Code Title Modular Weight

TTC005 Project (30) 15

TTC067 Aircraft Stability and Flight Test # 10

(ii) OPTIONAL MODULES

Modules with a total weight of 40 from: , TTC040, TTC050, TTC051, TTC053, TTC055, TTC060 and TTC102 to bring the total modular weight for the semester up to 65.

Code Title Modular Weight

TTC040 Noise Control 10

TTC050 Gas Turbine Design 1 # 10

TTC051 Aerodynamics 10

TTC053 Stress and Structural Analysis 10

TTC055 Avionic Systems 10

TTC060 Signal Analysis 10

TTC102 Introduction to Computational Fluid Dynamics 10

2.3.1 ***Semester 2***

(i) COMPULSORY MODULES (total modular weight 25)

TTC005 Project (30) 15

1. OPTIONAL MODULES

One module from Group 1 (Design modules) plus modules with a total weight of 30 from Group 2, to bring the total modular weight for the semester up to 55.

Group 1: (Design modules): TTC010, TTC011.

Code Title Modular Weight

TTC010 Aircraft Design # 10

TTC011 Gas Turbine Design 2 # 10

 Group 2: Modules from: TTC002, TTC041, , TTC054, TTC057, TTC070 to bring the total modular weight for the semester up to 55.

Code Title Modular Weight

TTC002 Finite Element Methods 10

TTC041 Mechanical Vibration 10

TTC054 Principles of Composite Materials and Structures 10

TTC057 Flight Control Systems 10

TTC070 Sound Radiation from Structures 10

In order to be eligible for the award of Honours, candidates must achieve at least 100 credits from Part C, including Aircraft Stability and Flight Test (TTC067), at least 30% in the Design module, (either TTC010 or TTC011) and 20% in all remaining modules.

Candidates failing to achieve credit in the Project (TTC005) at the first attempt will only be eligible for the award of a Pass degree following re-assessment; such candidates must have at least 100 credits from Part C, at least 30% in Aircraft Stability and Flight Test (TTC067) and 20% in all remaining modules.

**5. Criteria for admission to the programme:**

Entry Requirements

<http://www.lboro.ac.uk/departments/tt/aeronautical/beng/entry-requirements.html>

**6**Modules indicated with a # are not available for reassessment in the SAP.Module Manufacturing, Technology and Management (TTA208) is not available in the SAP. Module Structural Design Project (TTB208) is not available in the SAPModules Aircraft Design (TTC010), Gas Turbine Design 1 & 2 (TTC050 & TTC011) are not available in the SAP. A student needing to re-sit these modules has to undergo reassessment during the following academic year.

***Relative weighting of parts of the programme for the purposes of Final Degree Classification***

Candidates' final degree classification will be determined on the basis of their performance in degree level Module Assessments in Parts B and C in accordance with the scheme set out in Regulation XX. The average percentage marks for each Part will be combined in the ratio Part B 33.3 : Part C 66.7 to determine the Final Programme Mark.