University of Hertfordshire

Faculty for Engineering and Information Sciences

Title of Programme:

BEng (Honours) AADE

to include:
BEng (Honours) Aerospace Engineering
BEng (Honours) Aerospace Systems Engineering
BEng (Honours) Automotive Engineering
BEng (Honours) Automotive Engineering with Motorsport
BEng (Honours) Computer Aided Engineering
BEng (Honours) Manufacturing Engineering
BEng (Honours) Mechanical Engineering

EIBENGA

PROGRAMME SPECIFICATION

Start Date: September 2005

Date of Approval: (programme spec signed off by ADAQ) 22nd September 2005

Associate Dean (Academic Quality): Name in Block Capitals

Signature

Faculty

Programme Specification for BEng(Hons) Aerospace Engineering

This programme specification (PS) is designed for prospective students, enrolled students, academic staff and potential employers. It provides a concise summary of the main features of the programme and the intended learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the teaching, learning and assessment methods, learning outcomes and content of each module can be found in the Definitive Module Document (DMD) and the module teaching plan (Module Guide). Other relevant documents are listed in Section 21.

1. Awarding Institution/Body	University of Hertfordshire
2. Teaching Institution	University of Hertfordshire
3. University campuses	Hatfield, College Lane
4. Programme accredited by	IMechE, RAeS
5. Final Award	BEng Honours
6. Award titles	Aerospace Engineering
7. UCAS code (s)	H410
8. Modes of study	F/T or Sandwich
9. Relevant QAA subject benchmarking group	Engineering
10. Date of production/revision of PS	July 2005
11. Relevant cohorts	Levels 1, 2 and 3 students entering Sept 2004
12. Faculty and Department(s)	Faculty of Engineering and Information Sciences; Department of Aerospace, Automotive and Design Engineering

13. Educational Aims of the Programme

The programme has been devised in accordance with the University's general educational aims of programmes of study as set out in UPR AS/C/2 (2000).

The programme aims to provide:

- High quality education in aerospace engineering.
- An education for the individual that enhances his/her prospects of professional employment in engineering and business both in national and international industries.
- Studies that satisfy the professional requirements of The Royal Aeronautical Society and The Institution of Mechanical Engineers.

Further information is available in Box 15.

14. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas. The programme outcomes have been defined with reference to the QAA Benchmark Statements for Engineering and the Framework for Higher Education Qualifications in England, Wales and Northern Ireland, and relate to the typical student.

Knowledge and Understanding

A. Knowledge and Understanding of:

A1. The analytical methods employed by aerospace engineers.
A2. The fundamental engineering sciences appropriate to aerospace engineering.
A3. The design-to-build process.
A4. The basic principles and ethical considerations of the business of engineering.
A5. Professional engineering practice.

Teaching/learning methods & strategies:

Acquisition of A1 and A2 is through a combination of lectures, small group tutorials, coursework and laboratory work at levels 1 and 2 of the programme. Additional support is provided through the Mathematics Drop-In Centre.
Acquisition of A3 and A4 is through a combination of lectures, projects and coursework throughout the programme.
Acquisition of A5 is through lectures, projects and coursework at level 3.
On this programme, staff deploy a range of teaching and learning strategies in the most appropriate way for each

	individual module. This will vary depending on the subject nature of a particular module and the level of study. A more didactic approach will tend to be adopted at lower levels, in particular for A1 and A2. An increasingly self-directed and interactive approach will be adopted at higher levels, particularly for A3, A4 and A5. Throughout, the learner is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. Feedback is given to all students on all work produced. **Assessment:** Testing of the knowledge base is through a combination of unseen examinations (A1, A2) and assessed in-course assessments (A1-A5), in the form of laboratory reports (A2), essay assignments (A4), phase tests (A1), design exercises (A3) and project reports, portfolios and presentations (A3, A4, A5).
B. Intellectual Skills – able to: B1. Analyse and solve engineering problems using appropriate techniques. B2. Model and analyse relevant engineering systems. B3. Select appropriate computer based methods for engineering and communication. B4. Evaluate external influences on the design process. B5. Design appropriate systems, components or processes.	**Teaching/learning methods & strategies:** Intellectual skills are developed throughout the programme by the methods and strategies outlined in section A, above, again moving from a more didactic approach to an increasingly self-directed and interactive approach at higher levels, particularly for B3, B4 and B5. Analysis, problem solving and modelling skills are further developed through tutorial work, laboratory work and in-course exercises at levels 2 and 3 of the programme. Design and IT skills are further developed through project work, design exercises and case studies at all levels of the programme. Feedback is given to all students on all work produced. Throughout, the learner is encouraged to further develop intellectual skills by independent study. **Assessment:** Analysis, problem solving and modelling skills (B1, B2) are assessed through unseen examination papers, laboratory reports and coursework related to in-course exercises. Design and IT skills (B3, B4, B5) are assessed through coursework related to in-course exercises, presentations, portfolios and project reports.
C. Practical Skills – able to: C1. Apply appropriate analytical and modelling techniques to aerospace engineering problems. C2. Perform experimental work, and draw conclusions. C3. Use computer-based engineering tools. C4. Prepare technical documentation. C5. Evaluate the design of appropriate systems, components or processes. C6. Plan and manage a project, taking into account commercial and industrial constraints.	**Teaching/learning methods & strategies:** Practical skills are developed throughout the programme by the methods and strategies outlined in sections A and B, above, again moving from a more didactic approach to an increasingly self-directed and interactive approach at higher levels, particularly for C4, C5 and C6. C1 is developed through laboratory work, coursework assignments and tutorial work. C2 is developed through computing and laboratory work. C3 is developed through computing work, design exercises, coursework assignments and tutorial work. C4 is developed through project work and design exercises.

	C5 is developed through project work. C6 is developed through case study and project work. Feedback is given to all students on all work produced. **Assessment:** Practical skills are assessed through laboratory reports, coursework assignments, design exercise submissions, case study reports, presentations and project reports.
D. Transferable Skills – able to: D1. Communicate effectively, both orally and in writing. D2. Use commonly available IT tools. D3. Manage time and resources effectively. D4. Work effectively within a team. D5. Manipulate, sort and present data. D6. Solve problems in a logical manner. D7. Learn effectively and independently, in all aspects of life.	**Teaching/learning methods & strategies:** Transferable skills are developed throughout the programme by the methods and strategies outlined in sections A, B and C, above. D1 is developed through feedback on coursework reports, oral presentations and project reports. D2 is developed through their use in preparing project reports, laboratory reports, case studies, design work, etc. D3 is developed through project work planning and throughout the programme. D4 is developed through group project and assignment work. D5 and D6 are developed through lectures and tutorial work throughout the programme. D7 is developed and promoted throughout the programme. **Assessment:** D1, D2, D5 and D6 are assessed though coursework, individual major project and technical reports, and oral presentations. D4 is assessed by review of group project work. D3 and D7 are specifically assessed by review of an individual's progress during individual major project work.

15. Programme rationale

The Faculty of Engineering and Information Sciences offers BEng Honours degrees in a wide range of Engineering specialisms, which include Electronic, Communications and Electrical Engineering, Manufacturing Systems, Mechanical, Aerospace and Automotive Engineering. These programmes have been developed to satisfy the QAA Engineering Benchmarks, as well as the stringent academic requirements of a number of Professional Engineering Institutions, while at the same time allowing those without aspirations to Chartered Engineer status to gain an award. The first year of these programmes contain significant elements of commonality, with more limited commonality in the second year, allowing additional flexibility in terms of career choice in the early stages of study. The basic concepts and skills covered within these common modules are required by all Professional Engineers, enabling a broad insight into engineering and the engineering design process together with a rigorous underpinning of theoretical studies.

The Aerospace Engineering degree programme has been developed to (i) satisfy the QAA Engineering Benchmark requirements and (ii) meet the professional employment needs of the Aerospace industry, by providing graduates with the ability to work either in a design capacity or in a manufacturing environment. Aerospace engineering graduates can expect employment within the civil or military aircraft, defence systems, or space communications branches of the aerospace industry, and also in the sub-contract companies that supply the aerospace industry. After the mainly common first year of study, the programme further develops skills in engineering design through an understanding of, and practice in, the design process and real life problems requiring effective engineering solutions in an industrial and commercial environment.

The Aerospace Engineering programme has an emphasis on design of aircraft – aerodynamics, aircraft structures and materials, aircraft control & systems, aircraft propulsion, and incorporates a group design project that integrates all of these disciplines with the design of an aerospace vehicle.

16. Programme Structures, Features, Levels, Modules, and Credits

The programme is offered in full-time (3 years) or sandwich (4 years) modes, and in all cases leads to the award of a BEng Degree with Honours in Aerospace Engineering. Entry is normally at level 1 (with suitable A-level or equivalent qualifications), but is possible at level 2 with suitable qualifications (eg an HND in Engineering with appropriate subjects studied). Direct entry into Level 3 is also possible, for example following successful completion of two years of a similar BEng degree programme at another HE institution. In this case, the final award will not be accredited by the IMechE or RAeS. It is possible for a student to transfer to the MEng in Aerospace Engineering after level 1 or 2.

The programme structure and progression information below is provided for the honours award (Table 1). The Programme Learning Outcomes detailed in section 14 are developed and assessed through the constituent modules. Table 2 identifies where each learning outcome is assessed.

A designated sandwich programme leads to a University award in the sandwich mode, and the word "sandwich" appears on the award certificate. In order for the BEng to lead to an award in the sandwich mode, the student must undertake a period of approved work experience (industrial placement) of not less than 36 weeks with no possibility of exemption, normally between the end of Year 2 and the beginning of Year 4. This will normally be completed within the United Kingdom but with approval may be completed within other countries. Progress of the students' training is monitored by visits from University staff. Students will be required to document this period of work in accordance with the guidelines produced by the Faculty.

Table 1 Outline programme structure

Level 1

Compulsory modules	**Credit points**	**%exam**	**%coursework**
Fluid Mechanics and Thermodynamics (1AAD0014)	15	70	30
Materials & Electrical Science (1AAD0018)	15	60	40
Mechanical Science (1AAD0019)	15	60	40
Aerospace Technology and Business (1ACM0026)	15	0	100
Analytical Techniques 1 (1PAM0013)	30	60	40
Introduction to Manufacturing Technology (1AAD0017)	15	40	60
Introduction to Design (1AAD0003)	15	0	100

In order to progress from level 1 to level 2 of the programme, students must have achieved pass grades in level 1 modules of at least:

- 90 credit points (BEng with Honours programme).
- 75 credit points (BEng programme).

Level 2

Compulsory modules	**Credit points**	**%exam**	**%coursework**
Materials and Structures (2ACM0002)	15	70	30
Aerothermodynamics and Design (2AAD0019)	30	50	50
CAE and Structural Mechanics (2AAD0001)	15	50	50
Dynamics, Instrumentation & Control Systems (2ACM0059)	30	60	40
Analytical Techniques 2 (2PAM0022)	15	60	40
Project Management and Product Development (2AAD0029)	15	80	20

In order to enter the Final Year of the programme, students must have achieved pass grades in level 1 and 2 modules of at least:

- 210 credit points (BEng with Honours programme).
- 180 credit points (BEng programme).

Students who have not achieved the minimum progression requirements at the end of level 2 may be prevented from undertaking a placement. The policy relating to progression onto the placement year from level 2 is given in the Faculty Guidelines on Industrial Placements. Students on placement will be registered on the Placement Year Module.

Optional Industrial Placement Year 3 for Sandwich Awards

	Credit points	**%exam**	**%coursework**
Placement Year (3AAD0015)	0	0	100

Level 3

Compulsory modules	Credit points	%exam	%coursework
Mechanics and Properties of Materials (3ACM0003)	15	60	40
Aerospace Performance, Propulsion and Design (3AAD0017)	30	30	70
Stability and Control of Aircraft (3AAD0018)	15	60	40
Aerodynamics (3ACM0011)	15	60	40
Aerospace Structural Design and Analysis (3ACM0012)	15	60	40
Individual Major Project (3AAD0016)	30	0	100

The award of an Honours degree requires 360 credit points passed with 240 at levels 2 and 3 including at least 120 at level 3. Additionally, students must satisfactorily complete an Individual Project. A compensated pass cannot be awarded for the Individual Major Project.

The award of an Unclassified degree requires 270 credit points passed with 180 at levels 2 and 3 including at least 90 at level 3. Additionally, students must satisfactorily complete an Individual Project. A compensated pass cannot be awarded for the Individual Major Project.

For a Sandwich award, students must have completed a period of Industrial Training meeting the requirements set out in this Section.

Honours classification

The University has approved structure and assessment regulations common to all programmes (UPR AS/C/5). The following statement is a summary of the regulations. To determine the honours classification, the average grades of the most recent 120 credits at both levels 2 and 3 are calculated. If the level 3 average is higher, it alone is used for honours classification. If the average grade at level 2 is higher it makes a small but significant contribution to the honours classification in conjunction with the average level 3. Full details are provided in UPR AS/C/5.
The programme includes the following interim awards:

- University Certificate requiring 45 points at level 1.
- Certificate of Higher Education requiring 120 points at level 1.
- University Diploma requiring 180 points of which 60 points must be at level 2.
- Diploma of Higher Education in Engineering requiring 240 credit points including at least 120 at level 2.
- BEng unclassified in Aerospace Engineering requiring 270 credit points including 180 points at levels 2 and 3 of which 90 points must be level 3.

17. Support for students and their learning

Students are supported by:

- An induction week at the beginning of each new academic session
- An extensive Learning Resources Centre, incorporating a library and computer centre
- A Programme Tutor and Year Tutors
- A student handbook
- A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters etc
- An Accommodation Office
- An International Students Centre
- Overseas Student Orientation
- Printing, photocopying, laminating and document binding facilities
- Nightline – a confidential student listening and information service in the evening when other services are not available
- A confidential counselling services
- Bookshop
- A Mathematics Drop-in Centre
- A Departmental Partnership Room
- A Disabled Student Tutor
- An Equal Opportunities Officer

- Personal Tutors to provide academic and pastoral support
- Student representatives on programme committees
- The Students' Union
- Representation through programme committee
- Industry Contacts
- A project supervisor for final year projects
- Guided student centred learning through the use of UH StudyNet
- Faculty Computer Facilities
- Technical laboratories
- Technical support
- An Industrial Placements Office, Industrial Placement Tutor and Supervisors
- Flight course in final year of programme
- A flight simulator

18. Entry requirements

The normal entry requirements for the programme are:

- UCAS tariff points: 240-280 points from three GCE/VCE A Levels (including GCE A Level in mathematics plus physics, technology or engineering based subjects) or a VCE Double Award in engineering with an additional three units in mathematics based subjects. All key skills and other tariff points counted.

Or

- BTEC ND/NC in Engineering with 7 merits at level III; which must include Mathematics plus a numerate /technical/physical science.

Plus

- GCSE Mathematics, English and Science at grade C or above.

Applications are also welcomed from those holding other qualifications including equivalent Scottish Higher or Irish Higher Certificates, International Baccalaureate, and appropriate equivalent international qualifications.

Entry at level 2 is possible with suitable qualifications (for example, an HND in Engineering with merits and distinctions in appropriate subjects which must include Mathematics plus numerate/technical/physical sciences). Direct entry into Level 3 is also possible, for example following successful completion of two years of a similar BEng degree programme at another HE institution.

The programme is subject to the University's Principles, Policies, Regulations and Procedures for the Admission of Students to Undergraduate and Taught Postgraduate Schemes (UPR AS/C/4) and will take account of University policy and guidelines for assessing accredited prior learning (APL) or accredited prior experiential learning (APEL), published in UPR AS/C/1.

19. Programme management

The programme is managed by:

- An Associate Head of Department who has overall responsibility for the BEng (Hons) programmes in Aerospace Engineering, Aerospace Systems Engineering, Mechanical Engineering and Automotive Engineering
- A Programme Tutor and two year tutors who are responsible for the day to day management, each of these tutors is responsible for a specific year of the programme but can also advise students on the programme as a whole
- An Admissions Tutor, with specific responsibility for open days and selection
- An Industrial Placements Tutor to assist with the procurement of placements
- A designated Administrator to deal with day to day administration associated with the programme
- Module leaders who are responsible for individual courses (modules)
- A programme committee that includes student representation

20. Programme-specific assessment regulations

The programme is compliant with the University's generic assessment regulations (Structure and Assessment Regulations for Academic Programmes UPR AS/C/5). Further points of clarification and interpretation relevant to this specific programme are given below.

- In order for the BEng to lead to an award in the sandwich mode, the student must undertake a period of approved work experience (industrial placement) of not less than 36 weeks with no possibility of exemption
- A compensated pass cannot be awarded for the Individual Major Project
- The Programme operates a Faculty-wide policy for treatment of extenuating circumstances
- The programme includes a significant amount of group working, as a consequence specific regulations governing cheating and plagiarism are provided in the student handbook

21. Other sources of information

- University of Hertfordshire - www.herts.ac.uk
- Student Handbook
- Subject review report web address - www.qaa.ac.uk
- Engineering Benchmark statement - www.qaa.ac.uk
- QAA Guidelines – The Framework for Higher Education Qualifications in England, Wales and Northern Ireland – www.qaa.ac.uk
- Definitive Module Documents (DMDs)
- Academic Regulations for Undergraduate and Taught Postgraduate Studies
- University Policies and Regulations (UPRs) - www.herts.ac.uk/secreg/upr
- Other Academic Quality Policies and Regulations (AQPRs) - wisdom.herts.ac.uk/quality/
- University of Hertfordshire: Standard Procedures and Practices – wisdom.herts.ac.uk/quality/
- Faculty Placement Guidelines

22. Other information relevant to the programme

Study abroad for the second year of the programme is possible in the United Sates through an exchange agreement with the University of West Virginia, in Quebec through an agreement with CREPUQ, and in Europe through the SOCRATES-ERASMUS programme.

23. University policies relevant to the Programme

The University undertakes to use all reasonable endeavours to deliver, assess and administer this programme in accordance with this Programme Specification. At the same time it is recognised that it is in the nature of academic developments that changes, for example to the structure, curriculum, and assessment of a programme may be necessary in order to ensure that the programme remains up to date, in response to issues raised as a result of on-going monitoring and evaluation, and/or in order to conform to new regulatory requirements imposed by this institution, by professional or statutory bodies, or by national or governmental bodies.

The programme operates within the guidelines and policies relating to equal opportunities and environmental issues which may be agreed from time to time by the Board of Governors and/or the Academic Board of the University.

Where the programme is offered in collaboration with another institution these policies and guidelines will normally be those of the partner institution.

The programme operates in accordance with the University's Regulations Governing Studies Involving the Use of Human Subjects (UPR AS/C/2) agreed from time to time by the Academic Board of the University. However, where the programme is offered in collaboration with another institution (for example through a franchise arrangement for all or part of the programme) then specific approval must be obtained form the University for the operation of the programme within ethical guidelines prepared by the partner institution. The partner institution will be responsible for all insurance liability in connection with the observance of ethical guidelines.

Signed..... Date..22/9/05.....

Chair of Faculty Academic Quality Committee

BEng with Honours in Aerospace Engineering
Table 2: Development of Programme Learning Outcomes in the Constituent Modules

This map identifies where the programme learning outcomes are being developed and assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses. There may be other outcomes detailed in individual Definitive Module Documents (DMDs) that are not assessed.

			Programme Learning Outcomes																					
			Knowledge & Understanding					Intellectual Skills					Practical Skills						Transferable Skills						
	Modules	Code	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7
LEVEL 1	Analytical Techniques 1	1PAM0013	✓✓							✓			✓		✓✓						✓		✓✓	✓✓	✓
	Materials & Electrical Science	1AAD0018		✓✓				✓✓						✓✓							✓		✓		✓
	Mechanical Science	1AAD0019		✓✓				✓✓						✓✓							✓		✓		✓
	Introduction to Manufacturing Technolog	1AAD0017			✓✓	✓	✓				✓	✓✓		✓✓			✓	✓	✓		✓	✓			✓
	Introduction to Desigr	1AAD0003			✓✓	✓	✓			✓	✓	✓✓			✓✓	✓✓		✓	✓		✓	✓			✓
	Aerospace Technology and Busines:	1ACM0026				✓✓	✓												✓✓	✓✓	✓✓	✓✓			✓✓
	Fluid Mechanics and Thermodynamic	1AAD0014		✓✓										✓✓		✓					✓		✓		✓
LEVEL 2	Analytical Techniques 2	2PAM0022	✓✓							✓					✓						✓		✓	✓✓	✓
	CAE & Structural Mechanics	2AAD0001	✓	✓✓					✓✓	✓✓			✓✓	✓✓	✓✓	✓	✓		✓		✓		✓✓	✓	✓
	Dynamics, Instrumentation & Control System	2ACM0059	✓	✓✓				✓	✓✓	✓		✓	✓✓	✓✓	✓✓	✓	✓		✓		✓		✓	✓	✓
	Aerothermodynamics & Desigr	2AAD0019		✓✓	✓			✓	✓✓		✓✓	✓✓	✓	✓✓		✓	✓✓						✓	✓	✓
	Project Management & Product Developmen	2AAD0029	✓			✓	✓	✓✓				✓✓			✓✓	✓		✓✓	✓✓	✓		✓	✓✓	✓	✓
	Materials & Structures	2ACM0002		✓✓				✓	✓✓				✓	✓		✓					✓		✓	✓	✓
	Industrial Placement Yeai	3AAD0015	✓			✓✓	✓✓	✓			✓	✓				✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓✓	✓	✓
LEVEL 3	Mech & Props of Materials	3ACM0003	✓					✓✓	✓	✓✓			✓✓	✓✓	✓✓	✓			✓		✓		✓	✓	✓
	Stability & Control of Aircraf	3AAD0018	✓	✓				✓✓	✓✓	✓			✓✓	✓✓	✓						✓		✓	✓	✓
	Aerospace Performance, Propulsion & Desigr	3AAD0017		✓	✓✓	✓✓	✓✓	✓	✓✓		✓✓	✓✓	✓✓	✓		✓✓	✓	✓	✓✓	✓✓	✓✓	✓		✓✓	✓✓	✓✓
	Individual Major Projeci	3AAD0016	✓			✓	✓✓				✓	✓				✓✓	✓✓	✓✓	✓✓			✓		✓	✓	✓
	Aerospace Structural Design & Analysi:	3ACM0012	✓				✓✓	✓✓	✓	✓✓			✓✓		✓✓		✓				✓		✓	✓	✓
	Aerodynamics	3ACM0011	✓					✓✓	✓	✓✓			✓✓		✓✓		✓				✓		✓	✓	✓

Key

Learning Outcome which is assessed as part of the modul	✓✓
Learning Outcome not explicitly assessed as part of the modul	✓

Knowledge and Understanding
A1. The analytical methods employed by aerospace engineer
A2. The fundamental engineering sciences appropriate to aerospace engineerin
A3. The design-to-build process
A4. The basic principles and ethical considerations of the business of engineerin
A5. Professional engineering practice

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D7. Learn effectively and independently, in preparation for lifelong learnin

Programme Specification for BEng(Hons) Aerospace Systems Engineering

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3. University campuses	Hatfield, College Lane
4. Programme accredited by	IMechE, RAeS
5. Final Award	BEng Honours
6. Award titles	Aerospace Systems Engineering
7. UCAS code (s)	H430
8. Modes of study	F/T or Sandwich
9. Relevant QAA subject benchmarking group	Engineering
10. Date of production/revision of PS	July 2005
11. Relevant cohorts	Level 1, 2 and 3 students entering Sept 2004
12. Faculty and Department(s)	Faculty of Engineering and Information Sciences; Department of Aerospace, Automotive and Design Engineering

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Knowledge and Understanding

A. Knowledge and Understanding of:

A1. The analytical methods employed by aerospace systems engineers.
A2. The fundamental engineering sciences appropriate to aerospace systems engineering.
A3. The design-to-build process.
A4. The basic principles and ethical considerations of the business of engineering.
A5. Professional engineering practice.

Teaching/learning methods & strategies:

Acquisition of A1 and A2 is through a combination of lectures, small group tutorials, coursework and laboratory work at levels 1 and 2 of the programme. Additional support is provided through the Mathematics Drop-In Centre.
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On this programme, staff deploy a range of teaching and learning strategies in the most appropriate way for each

	individual module. This will vary depending on the subject nature of a particular module and the level of study. A more didactic approach will tend to be adopted at lower levels, in particular for A1 and A2. An increasingly self-directed and interactive approach will be adopted at higher levels, particularly for A3, A4 and A5. Throughout, the learner is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. Feedback is given to all students on all work produced. **Assessment:** Testing of the knowledge base is through a combination of unseen examinations (A1, A2) and assessed in-course assessments (A1-A5), in the form of laboratory reports (A2), essay assignments (A4), phase tests (A1), design exercises (A3) and project reports, portfolios and presentations (A3, A4, A5).
B. Intellectual Skills – able to: B1. Analyse and solve engineering problems using appropriate techniques. B2. Model and analyse relevant engineering systems. B3. Select appropriate computer based methods for engineering and communication. B4. Evaluate external influences on the design process. B5. Design appropriate systems, components or processes.	**Teaching/learning methods & strategies:** Intellectual skills are developed throughout the programme by the methods and strategies outlined in section A, above, again moving from a more didactic approach to an increasingly self-directed and interactive approach at higher levels, particularly for B3, B4 and B5. Analysis, problem solving and modelling skills are further developed through tutorial work, laboratory work and in-course exercises at levels 2 and 3 of the programme. Design and IT skills are further developed through project work, design exercises and case studies at all levels of the programme. Feedback is given to all students on all work produced. Throughout, the learner is encouraged to further develop intellectual skills by independent study. **Assessment:** Analysis, problem solving and modelling skills (B1, B2) are assessed through unseen examination papers, laboratory reports and coursework related to in-course exercises. Design and IT skills (B3, B4, B5) are assessed through coursework related to in-course exercises, presentations, portfolios and project reports.
C. Practical Skills – able to: C1. Apply appropriate analytical and modelling techniques to aerospace engineering problems. C2. Perform experimental work, and draw conclusions. C3. Use computer-based engineering tools. C4. Prepare technical documentation. C5. Evaluate the design of appropriate systems, components or processes. C6. Plan and manage a project, taking into account commercial and industrial constraints.	**Teaching/learning methods & strategies:** Practical skills are developed throughout the programme by the methods and strategies outlined in sections A and B, above, again moving from a more didactic approach to an increasingly self-directed and interactive approach at higher levels, particularly for C4, C5 and C6. C1 is developed through laboratory work, coursework assignments and tutorial work. C2 is developed through computing and laboratory work. C3 is developed through computing work, design exercises, coursework assignments and tutorial work. C4 is developed through project work and design exercises.

C5 is developed through project work.
C6 is developed through case study and project work.
Feedback is given to all students on all work produced.

Assessment:

Practical skills are assessed through laboratory reports, coursework assignments, design exercise submissions, case study reports, presentations and project reports.

D. Transferable Skills – able to:

D1. Communicate effectively, both orally and in writing.
D2. Use commonly available IT tools.
D3. Manage time and resources effectively.
D4. Work effectively within a team.
D5. Manipulate, sort and present data.
D6. Solve problems in a logical manner.
D7. Learn effectively and independently, in all aspects of life.

Teaching/learning methods & strategies:

Transferable skills are developed throughout the programme by the methods and strategies outlined in sections A, B and C, above.
D1 is developed through feedback on coursework reports, oral presentations and project reports.
D2 is developed through their use in preparing project reports, laboratory reports, case studies, design work, etc.
D3 is developed through project work planning and throughout the programme.
D4 is developed through group project and assignment work.
D5 and D6 are developed through lectures and tutorial work throughout the programme.
D7 is developed and promoted throughout the programme.

Assessment:

D1, D2, D5 and D6 are assessed though coursework, individual major project and technical reports, and oral presentations.
D4 is assessed by review of group project work.
D3 and D7 are specifically assessed by review of an individual's progress during individual major project work.

15. Programme rationale

The Faculty of Engineering and Information Sciences offers BEng Honours degrees in a wide range of Engineering specialisms, which include Electronic, Communications and Electrical Engineering, Manufacturing Systems, Mechanical, Aerospace and Automotive Engineering. These programmes have been developed to satisfy the QAA Engineering Benchmarks, as well as the stringent academic requirements of a number of Professional Engineering Institutions, while at the same time allowing those without aspirations to Chartered Engineer status to gain an award. The first year of these programmes contain significant elements of commonality, with more limited commonality in the second year, allowing additional flexibility in terms of career choice in the early stages of study. The basic concepts and skills covered within these common modules are required by all Professional Engineers, enabling a broad insight into engineering and the engineering design process together with a rigorous underpinning of theoretical studies.

The Aerospace Systems Engineering degree programme has been developed to (i) satisfy the QAA Engineering Benchmark requirements and (ii) meet the professional employment needs of the Aerospace industry, by providing graduates with the ability to work either in a design capacity or in a manufacturing environment. Aerospace Systems Engineering graduates can expect employment within the civil or military aircraft, defence systems, or space communications branches of the aerospace industry, and also in the sub-contract companies that supply the aerospace industry. After the mainly common first year of study, the programme further develops skills in engineering design through an understanding of, and practice in, the design process and real life problems requiring effective engineering solutions in an industrial and commercial environment.

The Aerospace Systems Engineering programme is multi-disciplinary, containing elements of aerodynamics, aircraft structures and materials, and aircraft propulsion. However it specialises in aircraft control and flight control systems, avionics and logistics engineering, and includes a group design project that integrates all of these disciplines with the design of an aerospace vehicle.

16. Programme Structures, Features, Levels, Modules, and Credits

The programme is offered in full-time (3 years) or sandwich (4 years) modes, and in all cases leads to the award of a BEng Degree with Honours in Aerospace Systems Engineering. Entry is normally at level 1 (with suitable A-level or equivalent qualifications), but is possible at level 2 with suitable qualifications (eg an HND in Engineering with appropriate subjects studied). Direct entry into Level 3 is also possible, for example following successful completion of two years of a similar BEng degree programme at another HE institution. In this case, the final award will not be accredited by the IMechE or RAeS. It is possible for a student to transfer to the MEng in Aerospace Systems Engineering after level 1 or 2.

The programme structure and progression information below is provided for the honours award (Table 1). The Programme Learning Outcomes detailed in section 14 are developed and assessed through the constituent modules. Table 2 identifies where each learning outcome is assessed.

A designated sandwich programme leads to a University award in the sandwich mode, and the word "sandwich" appears on the award certificate. In order for the BEng to lead to an award in the sandwich mode, the student must undertake a period of approved work experience (industrial placement) of not less than 36 weeks with no possibility of exemption, normally between the end of Year 2 and the beginning of Year 4. This will normally be completed within the United Kingdom but with approval may be completed within other countries. Progress of the students' training is monitored by visits from University staff. Students will be required to document this period of work in accordance with the guidelines produced by the Faculty.

Table 1 Outline programme structure

Level 1

Compulsory modules	**Credit points**	**%exam**	**%coursework**
Fluid Mechanics and Thermodynamics (1AAD0014)	15	70	30
Materials & Electrical Science (1AAD0018)	15	60	40
Mechanical Science (1AAD0019)	15	60	40
Aerospace Technology and Business (1ACM0026)	15	0	100
Analytical Techniques 1 (1PAM0013)	30	60	40
Introduction to Manufacturing Technology (1AAD0017)	15	40	60
Introduction to Design (1AAD0003)	15	0	100

In order to progress from level 1 to level 2 of the programme, students must have achieved pass grades in level 1 modules of at least:

- 90 credit points (BEng with Honours programme).
- 75 credit points (BEng programme).

Level 2

Compulsory modules	**Credit points**	**%exam**	**%coursework**
Avionics Systems (2AAD0022)	15	50	50
Aerothermodynamics and Design (2AAD0019)	30	50	50
CAE and Structural Mechanics (2AAD0001)	15	50	50
Dynamics, Instrumentation & Control Systems (2ACM0059)	30	60	40
Analytical Techniques 2 (2PAM0022)	15	60	40
Project Management and Product Development (2AAD0029)	15	80	20

In order to enter the Final Year of the programme, students must have achieved pass grades in level 1 and 2 modules of at least:

- 210 credit points (BEng with Honours programme).
- 180 credit points (BEng programme).

Students who have not achieved the minimum progression requirements at the end of level 2 may be prevented from undertaking a placement. The policy relating to progression onto the placement year from level 2 is given in the Faculty Guidelines on Industrial Placements. Students on placement will be registered on the Placement Year Module.

Optional Industrial Placement Year 3 for Sandwich Awards

	Credit points	%exam	%coursework
Placement Year (3AAD0015)	0	0	100

Level 3

Compulsory modules	**Credit points**	**%exam**	**%coursework**
Aerospace Performance, Propulsion and Design (3AAD0017)	30	30	70
Stability and Control of Aircraft (3AAD0018)	15	60	40
Control Systems (3AAD0007)	15	60	40
Logistics Engineering (3ACM0014)	15	60	40
Individual Major Project (3AAD0016)	30	0	100
Aerodynamics (3ACM0011)	15	60	40

The award of an Honours degree requires 360 credit points passed with 240 at levels 2 and 3 including at least 120 at level 3. Additionally, students must satisfactorily complete an Individual Project. A compensated pass cannot be awarded for the Individual Major Project.

The award of an Unclassified degree requires 270 credit points passed with 180 at levels 2 and 3 including at least 90 at level 3. Additionally, students must satisfactorily complete an Individual Project. A compensated pass cannot be awarded for the Individual Major Project.

For a Sandwich award, students must have completed a period of Industrial Training meeting the requirements set out in Section 16.

Honours classification

The University has approved structure and assessment regulations common to all programmes (UPR AS/C/5). The following statement is a summary of the regulations. To determine the honours classification, the average grades of the most recent 120 credits at both levels 2 and 3 are calculated. If the level 3 average is higher, it alone is used for honours classification. If the average grade at level 2 is higher it makes a small but significant contribution to the honours classification in conjunction with the average level 3. Full details are provided in UPR AS/C/5.
The programme includes the following interim awards:

- University Certificate requiring 45 points at level 1.
- Certificate of Higher Education requiring 120 points at level 1.
- University Diploma requiring 180 points of which 60 points must be at level 2.
- Diploma of Higher Education in Engineering requiring 240 credit points including at least 120 at level 2.
- BEng unclassified in Aerospace Systems Engineering requiring 270 credit points including 180 points at levels 3 of which 90 points must be level 3.

17. Support for students and their learning

Students are supported by:

- An induction week at the beginning of each new academic session
- An extensive Learning Resources Centre, incorporating a library and computer centre
- A Programme Tutor and Year Tutors
- A student handbook
- A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters etc
- An Accommodation Office
- An International Students Centre
- Overseas Student Orientation
- Printing, photocopying, laminating and document binding facilities
- Nightline – a confidential student listening and information service in the evening when other services are not available
- A confidential counselling services
- Bookshop
- A Mathematics Drop-in Centre
- A Departmental Partnership Room
- A Disabled Student Tutor

- An Equal Opportunities Officer
- Personal Tutors to provide academic and pastoral support
- Student representatives on programme committees
- The Students' Union
- Representation through programme committee
- Industry Contacts
- A project supervisor for final year projects
- Guided student centred learning through the use of UH StudyNet
- Faculty Computer Facilities
- Technical laboratories
- Technical support
- An Industrial Placements Office, Industrial Placement Tutor and Supervisors
- Flight course in final year of programme
- A flight simulator

18. Entry requirements

The normal entry requirements for the programme are:

- UCAS tariff points: 240-280 points from three GCE/VCE A Levels (including GCE A Level in mathematics plus physics, technology or engineering based subjects) or a VCE Double Award in engineering with an additional three units in mathematics based subjects. All key skills and other tariff points counted.

Or

- BTEC ND/NC in Engineering with 7 merits at level III; which must include Mathematics plus a numerate /technical/physical science.

Plus

- GCSE Mathematics, English and Science at grade C or above.

Applications are also welcomed from those holding other qualifications including equivalent Scottish Higher or Irish Higher Certificates, International Baccalaureate, and appropriate equivalent international qualifications.

Entry at level 2 is possible with suitable qualifications (for example, an HND in Engineering with merits and distinctions in appropriate subjects which must include Mathematics plus numerate/technical/physical sciences). Direct entry into Level 3 is also possible, for example following successful completion of two years of a similar BEng degree programme at another HE institution.

The programme is subject to the University's Principles, Policies, Regulations and Procedures for the Admission of Students to Undergraduate and Taught Postgraduate Schemes (UPR AS/C/4) and will take account of University policy and guidelines for assessing accredited prior learning (APL) or accredited prior experiential learning (APEL), published in UPR AS/C/1.

19. Programme management

The programme is managed by:

- An Associate Head of Department who has overall responsibility for the BEng (Hons) programmes in Aerospace Engineering, Aerospace Systems Engineering, Mechanical Engineering and Automotive Engineering
- A Programme Tutor and two year tutors who are responsible for the day to day management, each of these tutors is responsible for a specific year of the programme but can also advise students on the programme as a whole
- An Admissions Tutor, with specific responsibility for open days and selection
- An Industrial Placements Tutor to assist with the procurement of placements
- A designated Administrator to deal with day to day administration associated with the programme
- Module leaders who are responsible for individual courses (modules)
- A programme committee that includes student representation

20. Programme-specific assessment regulations

The programme is compliant with the University's generic assessment regulations (Structure and Assessment Regulations for Academic Programmes UPR AS/C/5). Further points of clarification and interpretation relevant to this specific programme are given below.

- In order for the BEng to lead to an award in the sandwich mode, the student must undertake a period of approved work experience (industrial placement) of not less than 36 weeks with no possibility of exemption
- A compensated pass cannot be awarded for the Individual Major Project
- The Programme operates a Faculty-wide policy for treatment of extenuating circumstances
- The programme includes a significant amount of group working, as a consequence specific regulations governing cheating and plagiarism are provided in the student handbook

21. Other sources of information

- University of Hertfordshire Prospectus – www.herts.ac.uk
- Student Handbook
- Subject review report web address - www.qaa.ac.uk
- Engineering Benchmark statement - www.qaa.ac.uk
- QAA Guidelines – The Framework for Higher Education Qualifications in England, Wales and Northern Ireland – www.qaa.ac.uk
- Definitive Module Documents (DMDs)
- Academic Regulations for Undergraduate and Taught Postgraduate Studies
- University Policies and Regulations (UPRs) – www.herts.ac.uk/secreg/upr
- Other Academic Quality Policies and Regulations (AQPRs) – wisdom.herts.ac.uk/quality/
- University of Hertfordshire: Standard Procedures and Practices – wisdom.herts.ac.uk/quality/
- Faculty Placement Guidelines

22. Other information relevant to the programme

Study abroad for the second year of the programme is possible in the United Sates through an exchange agreement with the University of West Virginia, in Quebec through an agreement with CREPUQ, and in Europe through the SOCRATES-ERASMUS programme.

23. University policies relevant to the Programme

The University undertakes to use all reasonable endeavours to deliver, assess and administer this programme in accordance with this Programme Specification. At the same time it is recognised that it is in the nature of academic developments that changes, for example to the structure, curriculum, and assessment of a programme may be necessary in order to ensure that the programme remains up to date, in response to issues raised as a result of on-going monitoring and evaluation, and/or in order to conform to new regulatory requirements imposed by this institution, by professional or statutory bodies, or by national or governmental bodies.

The programme operates within the guidelines and policies relating to equal opportunities and environmental issues which may be agreed from time to time by the Board of Governors and/or the Academic Board of the University.

Where the programme is offered in collaboration with another institution these policies and guidelines will normally be those of the partner institution.

The programme operates in accordance with the University's Regulations Governing Studies Involving the Use of Human Subjects (UPR AS/C/2) agreed from time to time by the Academic Board of the University. However, where the programme is offered in collaboration with another institution (for example through a franchise arrangement for all or part of the programme) then specific approval must be obtained form the University for the operation of the programme within ethical guidelines prepared by the partner institution. The partner institution will be responsible for all insurance liability in connection with the observance of ethical guidelines.

Signed.....F Reed..... Date...22/9/05...

Chair of Faculty Academic Quality Committee

BEng with Honours in Aerospace Systems Engineering
Table 2: Development of Programme Learning Outcomes in the Constituent Modules

This map identifies where the programme learning outcomes are being developed and assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses. There may be other outcomes detailed in individual Definitive Module Documents (DMDs) that are not assessed.

			Programme Learning Outcomes																					
			Knowledge & Understanding					Intellectual Skills					Practical Skills						Transferable Skills						
	Modules	Code	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7
LEVEL 1	Analytical Techniques 1	1PAM0013	✓✓							✓			✓		✓✓						✓		✓✓	✓✓	✓
	Materials & Electrical Science	1AAD0018		✓✓				✓✓						✓✓							✓		✓		✓
	Mechanical Science	1AAD0019		✓✓				✓✓						✓✓							✓		✓		✓
	Introduction to Manufacturing Technolog	1AAD0017			✓✓	✓	✓				✓	✓✓		✓✓			✓	✓	✓		✓	✓			✓
	Introduction to Desigr	1AAD0003			✓✓	✓	✓			✓	✓	✓✓			✓✓	✓✓		✓	✓		✓	✓			✓
	Aerospace Technology and Busines:	1ACM0026			✓✓	✓✓	✓												✓✓	✓✓	✓✓	✓✓			✓✓
	Fluid Mechanics and Thermodynamic	1AAD0014		✓✓										✓✓		✓					✓		✓		✓
LEVEL 2	Analytical Techniques 2	2PAM0022	✓✓							✓					✓						✓		✓	✓✓	✓
	CAE & Structural Mechanics	2AAD0001	✓	✓✓					✓✓	✓✓			✓✓	✓✓	✓✓	✓	✓		✓		✓		✓✓	✓	✓
	Dynamics, Instrumentation & Control System	2ACM0059	✓	✓✓				✓	✓✓	✓		✓	✓✓	✓✓	✓✓	✓	✓		✓		✓		✓✓	✓	✓
	Aerothermodynamics & Desigr	2AAD0019		✓✓	✓			✓	✓✓		✓✓	✓✓	✓	✓✓		✓	✓✓				✓		✓	✓	✓
	Project Management & Product Developmen	2AAD0029	✓			✓	✓	✓✓				✓✓			✓✓	✓		✓✓	✓✓	✓		✓	✓✓	✓	✓
	Avionics Systems	2AAD0022	✓				✓	✓✓	✓	✓			✓✓	✓	✓	✓✓		✓	✓✓	✓	✓		✓	✓	✓
	Industrial Placement Yea	3AAD0015	✓			✓✓	✓✓	✓			✓	✓				✓✓	✓✓	✓✓	✓✓	✓✓	✓	✓	✓	✓	✓✓
LEVEL 3	Aerodynamics	3ACM0011	✓					✓✓	✓	✓✓			✓✓		✓✓		✓				✓		✓	✓	✓
	Stability & Control of Aircraf	3AAD0018	✓	✓				✓✓	✓✓	✓			✓✓	✓✓	✓						✓		✓	✓	✓
	Aerospace Performance, Propulsion & Desigr	3AAD0017		✓	✓✓	✓✓	✓✓	✓	✓✓		✓✓	✓✓	✓✓	✓		✓✓	✓	✓	✓✓	✓✓	✓	✓✓	✓✓	✓✓	✓
	Individual Major Projec	3AAD0016	✓			✓	✓✓				✓	✓				✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		✓✓	✓✓	✓✓
	Control Systems	3AAD0007	✓					✓✓	✓	✓✓		✓✓	✓✓	✓	✓✓	✓	✓		✓		✓		✓	✓	✓
	Logistics Engineering	3ACM0014	✓				✓		✓✓	✓	✓✓		✓		✓	✓	✓		✓		✓		✓	✓	✓

Key

Learning Outcome which is assessed as part of the modul	✓✓
Learning Outcome not explicitly assessed as part of the modul	✓

Knowledge and Understanding
A1. The analytical methods employed by aerospace systems enginee
A2. The fundamental engineering sciences appropriate to aerospace systems engineerin
A3. The design-to-build process
A4. The basic principles and ethical considerations of the business of engineerin
A5. Professional engineering practic

Intellectual Skills
B1. Analyse and solve engineering problems using appropriate technique
B2. Model and analyse relevant engineering system
B3. Select appropriate computer based methods for engineering an communicatior
B4. Evaluate external influences on the design proces
B5. Design appropriate systems, components or processe

Practical Skills
C1. Apply appropriate analytical and modelling techniques to aerospac engineering problems
C2. Perform experimental work, and draw conclusion
C3. Use computer-based engineering tools
C4. Prepare technical documentatior
C5. Evaluate the design of appropriate systems, components or processe
C6. Plan and manage a project, taking into account commercial an industrial constraints

Transferable Skills
D1. Communicate effectively, both orally and in writin
D2. Use commonly available IT tool
D3. Manage time and resources effectivel
D4. Work effectively within a tean
D5. Manipulate, sort and present data
D6. Solve problems in a logical manne
D7. Learn effectively and independently, in preparation for lifelong learnir