# Engineering Early Professional Development Programme

# (EEPDP)

## STUDENTS' HANDBOOK

**In this brochure we aim to provide you with as much information about RREEPDP as possible.**

**If however you do want to know more please do not hesitate to contact either Erica Tyson or Mel Winfield, both based at Derby.**

**This handbook will be regularly updated on the Rolls-Royce Intranet.**


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If you have any queries about either the **RREEPDP or CPDA** programme, please contact the CPDA Secretary.


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If you have any queries about the **MTEC Programme**, please contact the co-ordinator at Newcastle University.


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# 1.0 Aims

- To increase the knowledge, understanding and skills (including manufacturing, mathematics and physics) of the Engineering Graduate population.

- To embed the philosophy and practice of Continuing Professional Development, beyond formal training programmes.

- To provide the foundation for an MSc.

# 2.0 Objectives

The students will have increased their knowledge and understanding in a range of technical and business aspects in agreement with their personal development plans and their manager.

The students will have achieved 60 academic credits at Master's level. This is one third of the requirement for a Master's award, and qualifies for a post-graduate certificate.

The students (and their managers) will be in an informed position to make the decision whether to continue to complete an appropriate MSc.

# 3.0 General Summary of the RREEPDP

## 3.1 What is RREEPDP?

The Rolls-Royce Engineering Early Professional Development Programme (RREEPDP) is a part-time modular postgraduate programme. The Aerospace version was established in 1999 and is run as a partnership between Rolls-Royce, the University of Bristol and the University of the West of England. The MTEC (MTEC – Marine Technology Education Consortium) version was established in 2002 as a partnership to support the professional development of graduates in the engineering function. This handbook deals specifically with the Aerospace option.

Modules on the RREEPDP are supplied by the participating Universities and also by the University of Wales. The modules available offer general training in technology and business management. All of the modules are worth 10 credit points. Students on the RREEPDP take a selection of modules up to the value of 60 credit points before deciding whether to accept a Postgraduate Certificate or continue with their studies and transfer on to the MSc programme. For the Postgraduate Certificate, students must ensure that they choose at least 3 modules from their awarding University. Modules are accredited by the partner universities supporting the CPDA, which is a part-time postgraduate programme developed specifically for engineers in the Aerospace industry (see section 3.11).

## 3.2 Why do the RREEPDP?

- To enable fast acquisition of knowledge, understanding and skills in areas of immediate and longer term career relevance.
- To increase gearing on existing training and more likelihood of applying knowledge to the workplace.

## 3.3 Who is it for?

The programme is designed for all Early Career Professional Engineers whatever their route of entry, i.e. graduate training, intensive training, direct entry or technologist bridge. Engineering is to be interpreted in its widest sense to include manufacturing engineers as well as, for example, graduates with mathematics or materials backgrounds.

## 3.4 Am I eligible to enrol on to the RREEPDP?

You are normally required to have a 2.1 degree in a Science, Engineering or Mathematical based subject. If you have less than a 2.1 degree then industrial experience is required. Concession on experience may be approved on an individual basis – contact the CPDA Office.

## 3.5 What is involved in a module?

The programme is modular and each module is assessed either by work-based assignment, by an examination or a combination of both. Assignments must be completed by eight weeks after the end of the taught part of the module. Exams may be after 4 weeks.

- A module comprises pre-course work, the taught component and a post module assignment or exam to be completed by eight weeks after the end of the taught component;
- Modules are worth 10 credits based on approximately 100 hours of study. This includes the taught component which is approximately a third of the hours required;
- Students should receive at least 30 days taught training time over the two-year period;
- Where possible, modules will be delivered on Company premises.

## 3.6 What awards are available on completion of the RREEPDP?

After the successful completion of the RREEPDP (60 credits), students have the choice of accepting a Postgraduate Certificate from either the University of Bristol or the University of the West of England, depending on the modules they have selected. The titles available from the two universities in Bristol are as follows:

Aerospace, Design, Manufacture and Management - University of Bristol
Technology Management (Aerospace) - University of the West of England
Total Technology (Aerospace) – University of the West of England

## 3.7 What selection of modules should I take?

Students have the choice of completing any of the modules under section 7.0. The choice of modules should be approved by their Early Career Development Advisor or Line Manager. Module selection can be adjusted in line with later career direction definition. Holistic Gas Turbine and Excellence through Programme Management are mandatory, whilst Lean Thinking is strongly recommended. There are also module selection criteria to take into account which determine the Postgraduate Certificate that the student will receive. **If you do not fulfil any of the criteria below, you will not be eligible to gain one of the following awards. It is therefore very important that you choose your modules carefully**.

**Postgraduate Certificate in Aerospace Design, Manufacture and Management**
(University of Bristol)

This can be awarded on the successful completion of 60 credits including a pass in all post-module assignments. A balance of technical and management modules is expected, including one module from a minimum of two of the different areas of Aerospace, Design, Manufacture, and Management. Students are required to take a minimum of half of their modules (3 modules at 10 credit points) from the University of Bristol, and two thirds (4 modules at 10 credit points) from the Bristol Consortium. Please see table of modules available at section 7.0. This categorises them all in terms of the different classifications as outlined above and identifies by which university they provided.

**Postgraduate Certificate in Total Technology (Aerospace)**
(University of the West of England)

This can be awarded on the successful completion of 60 credit points, including a pass in all post-module assignments. Students must complete 2-3 core modules and the remaining ones must be technology modules. [N.B. Please note that there are 3 core modules available through the RREEPDP, so if students wish to gain a Certificate through UWE, they must take 2 out of these 3 modules]. Students are required to take a minimum of half of their modules (3 modules at 10 credit points) from the University of the West of England, and two thirds (4 modules at 10 credit points) from the Bristol Consortium. Please see table of modules available at section 7.0.

**Postgraduate Certificate in Technology Management (Aerospace)**
(University of the West of England)

This can be awarded on the successful completion of 60 credit points, including a pass in all post-module assignments. Students must complete 4 Management modules including 2-3 core modules and the remaining ones must be technology modules. Students are required to take a minimum of half of their modules (3 modules at 10 credit points) from the University of the West of England, and two thirds (4 modules at 10 credit points) from the Bristol Consortium. Please see table of modules available at section 7.0.

### 3.7.1 Duplication of Subject Material

Students are not allowed to take modules which reflect or duplicate academic courses already taken, either at the undergraduate or postgraduate level. If in doubt check with the CPDA Office first if you they feel that a module maybe duplicating material you have already studied.

### 3.7.2 Cancellation Policy

For modules that are offered through the RREEPDP, students must notify the RREEPDP Administrator of a cancellation at least 4 weeks before the start of the module, to minimise wasted resources. This will give the opportunity to reallocate the place. For modules offered through the CPDA, the participant is required to contact the CPDA Secretary (0117 954 5665), rachel.phelon@bristol.ac.uk at least 4 weeks prior to the running of the module. If students do not provide the necessary notice period in the event of a cancellation, the full module fee will be charged to the company. There may also be a charge for cancelling accommodation depending on the hotel's policy. The cancellation fee may be waived in very special circumstances but this will not be done if the reason for cancellation is work commitments. The company may decide to send another employee in place of the student that is unable to attend.

## 3.8 How do I enrol?

- Talk to your Early Career Development Advisor or Line Manager, who will help you with your module selection;
- Email Mel Winfield to register your interest;
- If possible, attend an induction day: these generally occur between October and December in Bristol and Derby. Mel Winfield will provide you with a date for these;
- Complete the CPDA joint application form which can be found on the RREEPDP website, with which you will need to submit the following:
    i. UWE Enrolment Form and UWE Student ID/Library Application Form
    ii. colour passport photos (x 4)
    iii. a copy of your degree certificate
    iv. a detailed CV
    v. the name and address of an academic referee (on the application form), which we will contact on your behalf
    vi. an industrial reference (which you will need to organise through your Early Career Development Advisor or Line Manager).

## 3.9 How long will I have to complete?

You are enrolled on to the Postgraduate Certificate and have 2 years to complete it. You start the programme from the date you attend your first module. This is still the case whether an assignment is submitted or not. Students who continue on to the MSc after the Certificate have a further 3 years to complete the Masters programme. You are encouraged to complete 3-4 modules per year and if you decide to transfer to the CPDA MSc, you should start thinking about your project after the completion of 60 credits (the RREEPDP). You should allow at least 1 year to complete the project.

### 3.9.1 Suspensions

Students may apply for a suspension of studies in the event that they are unable to continue studying for a specific period of time, (i.e. in the event of an overseas placement, parenthood, serious illness, etc). The maximum period of time given for a suspension is normally a year but if more time is required the request will be put forward to the Vice-Chancellor of the appropriate University, who has the final decision.

In the event that a student requires a suspension, s/he should submit a letter to the CPDA Secretary, detailing the reasons behind the request, with the date when s/he will be resuming his/her studies. The CPDA Office will also require either a letter or an email from the student's line manager to support the suspension of studies.

### 3.9.2 Withdrawing from the programme

Students wanting to withdraw from the programme because it is not meeting their direct needs or they are failing to maintain progress should be aware of the opportunity to suspend their studies – see section 3.9.1. If it is decided to continue with the withdrawal process, students must inform the CPDA Secretary of their intentions to withdraw from the programme and if they are fully registered they will be required to complete a Withdrawal Form, which will be sent to them by email by the CPDA Secretary, or can be found on the EEPDP website.

If a withdrawal from the programme is necessary then students should be aware of the option to reapply within a period of two years from the date of withdrawing, in order to complete the programme at a later stage. If students decide to take this option, any marks obtained so far through the RREEPDP will not be counted towards the award when re-registering. The modules achieved will only be counted as academic credit.

## 3.10 What happens at the end?

- Completing RREEPDP is a stand-alone achievement recognised by a Post Graduate Certificate;
- Or, with business agreement, you can carry on to study a full MSc.

## 3.11 What is the CPDA?

The Aerospace RREEPDP is accredited by the University of Bristol and the University of the West of England as part of the module programme for the Bristol and West of England Consortium for Continuing Professional Development in Aerospace - CPDA. Postgraduate programmes available through the CPDA are Certificate, Diploma, MSc and Engineering Doctorate.

The CPDA is run by the Bristol Consortium, which is a partnership between the two Universities and industrial partners such as Rolls-Royce plc, Agusta Westland, Airbus UK, QinetiQ and the MOD amongst others.

The majority of students on the CPDA scheme are undertaking the MSc, which comprises 180 credits at Masters level, 120 through modular courses and 60 from a dissertation on a work-based research project.

Progression from the RREEPDP programme can lead to:

| | |
|---|---|
| MSc in Aerospace Design, Manufacture and Management | University of Bristol |
| MSc in Technology Management (Aerospace) | University of the West of England |
| MSc in Total Technology (Aerospace) | University of the West of England |
| [MSc in Marine Technology | University of Newcastle] |

**Alternative Masters Routes**

Those interested in Programme Management and Quality should consult the relevant Company Professional development frameworks.

For those considering a more technical career, a PhD or Engineering Doctorate (EngD) might be more appropriate at a later date. The CPDA now offers an EngD in Aerospace, Design, Manufacture and Management. For more details please contact the CPDA Office (0117 954 5665).

Management and MBA programmes are in the company Management Development portfolio in conjunction with the Open University. (You need to be in a team leader or management position to be nominated for these courses).

## 3.12 Am I eligible to transfer on to the CPDA?

Students who have completed their 60 credits through the RREEPDP and are ready to transfer across to the CPDA to complete the MSc programme are required to have accumulated at least 3 years of industrial experience before they can transfer and normally need to have achieved an average of 60%. The student's module average mark on the RREEPDP will be assessed for suitability for the CPDA. If the average mark is not of an acceptable standard, the student will have the chance to take part in a formal interview to assess their suitability for the programme.

If the student has less than 3 years experience at the postgraduate level, s/he is required to produce a transfer report with both academic and industrial content to show his/her capability. If the report is not deemed to show enough experiential competence, the student may be requested to defer until the 3 years has been reached.

## 3.13 How do I transfer to the CPDA?

- You need to seek approval from your line and business manager;
- Check the CPDA website for the latest module fees that your department will need to cover from its training budget;
- The CPDA Office must receive written confirmation of this approval (by email or fax);
- The CPDA Office will forward your transfer application to the CPDA Admissions Tutors who will approve (or otherwise) the transfer;
- The CPDA Office will then confirm the result with you and if successful, confirm the transfer to you in writing. You will receive information about the CPDA and a booking form to book on to your six remaining modules.

# 4.0 Library and Computing Facilities

**Rolls-Royce Library Resources**
We recommend that you gain access to Books 24/7 on-line library via the Learning Site. Books 24/7 is a reference library available to students that includes Engineering Books to help with your studies. Also, there are a collection of course books available for your use in the RREEPDP Office. Mel Winfield can advise on titles available for loan.

**University Resources**
Once you have confirmed your acceptance on the course and returned your completed postgraduate registration form and Student ID/Library Card form you will be sent Library Cards for both of the two universities. The Student ID Library Card from UWE will be sent with a separate offer letter from the University. You must confirm receipt of the UWE Library Card and offer letter. This completes the registration process and acts as formal notification of enrolment on the RREEPDP.

**University of Bristol**
On completion of the 'Offer of Admission' form, Registration and UoB Library forms, students will be sent a welcome letter, together with a University of Bristol Library Card. The letter will explain the process of obtaining their username and password via the web. The username and password will enable students to log into the University of Bristol computer system to access PC's around the university – for Microsoft Office, accessing the library catalogue, email and searching the net.

Since RREEPDP students are not based on campus, it is a good idea for you to organise for your University of Bristol emails to be redirected to an email address at work or at home which is accessed on a daily basis. The Library often sends emails to students regarding books that are on loan or books that are overdue. In order to redirect email, you need to complete the form under the heading 'Redirection and Restoration of a Bristol Email Address', which can be accessed from the University of Bristol website at:
http://www.bristol.ac.uk/is/services/register/registercomputing.html.

The transfer of emails will take about 1 to 2 days. Alternatively, emails can be viewed using the Silkymail facilities on the University of Bristol website at the following address: https://webmail.bris.ac.uk.

As taught postgraduate students, students automatically have access to ATHENS. ATHENS provides access to some national resources such as on-line databases and some electronic journals. If you are working from home, or elsewhere, and your terminals are not attached to the University of Bristol network, please see information about how to configure the work/home terminal for off-campus access at the following website address: http://www.bris.ac.uk/is/informationgateway/electronicjournals/ejhelppa.html.

If you have any questions regarding your username and password, contact the Information Services Department on 0117 928 7870 or 0117 954 5988. If you have any questions regarding the general use of the Faculty of Engineering's library facilities at Queens Building, then contact the library via email: library-enquiries@bristol.ac.uk or Tel: (0117) 928 8000.

**University of the West of England**
Students will receive a Student ID Library Card and username and password through the post from UWE. This, like the University of Bristol process, will enable full access to the Library and Computer Facilities there. If you have any questions relating to your username and password, contact the BIT team via email: bit.registration@uwe.ac.uk or Tel: +44(0)117 328 2046.
If you have any questions relating to the general use of the library facilities then contact Dianne Nelson at the Library on 0117 3282284 (Dianne.Nelson@uwe.ac.uk).

**Uses for your library PIN**

**University of Bristol**

Students will need the library PIN as well as the library barcode number to do any of the following:

- To reserve an item currently on loan using the library catalogue;
- To reserve a Short Loan Collection (SLC) item for a particular time using the library catalogue;
- To use the 'My account' option on the library catalogue;
- To use the 'Inter-library loan' option on the library catalogue in order to request material not held by the University Library.

In order to obtain your PIN number, you are requested to contact the Part-time Student Support service through one of the contact methods below, or you are welcome to visit their website address at http://www.bris.ac.uk/is/library/addlibs/ for further information.

Telephone: 0117 928 7140
Email: add-libs@bristol.ac.uk

**University of the West of England**

You will need your library PIN as well as your library barcode number to do any of the following:

- To place a hold on a book that is on loan to somebody else;
- To renew the books you have on loan yourself;
- To check how many items you have on loan and when they are due back;
- To use the computing facilities at UWE;
- To use Hyperion, a system linked to the library's catalogue which gives access to past exam papers, among other things.

In order to obtain your PIN number, you can contact the library via the weblink at http://www.uwe.ac.uk/library/info/faq/passwords1.htm.

**Students not based in Bristol**

Students who are not based in the Bristol area, do have access to ATHENS via the University of Bristol and the University of the West of England (UWE) Library/Information Services websites. However, there is an option to order books through the Inter-library loan service on the library catalogue in order to request material not held by the University of Bristol or the University of the West of England Libraries. The University of the West of England is also a member of UK Libraries Plus, which is a co-operative scheme with over 100 University Library members. It enables part-time, distance learning and placement students to borrow material from other libraries in closer proximity to where they live or work. A list of participating universities can be found at www.uklibrariesplus.ac.uk.

For further information on the options available please access: http://www.uwe.ac.uk/library/info or the University of Bristol's web link listed above.

# 5.0 Booking onto a Module

The module programme, including dates and venues will be issued to students annually and as and when additional modules have been arranged. To attend a module, bookings should be made through Mel Winfield via telephone or email.

The latest schedule can be found on the RREEPDP website.

# 6.0 Joining Instructions

Joining Instructions are sent out approximately 4 weeks before each module. Included in these instructions are the following:

- Details of venue
- Module Timetable
- Pre-module reading (where appropriate)
- Pre-module work (where appropriate)

Module Evaluation Questionnaire
You will be required to complete an evaluation questionnaire at the end of each module to rate the course on a number of criteria. If you have any suggestions as to how the module may be improved, use this questionnaire to explain them.

Post Module Evaluation Questionnaire
The CPDA Office will email EEPDP students with a PMA questionnaire when they submit their electronic assignment.

The responses are collated and an overall module and assignment evaluation report will be produced. This report is sent to the Module Leader, Field Group Leader and Rolls-Royce Administrator. The reports are also reviewed by the University Field Group Representatives and any issues will be discussed at the Academic Management Committee, which is held twice yearly.

# 7.0 Module offered as part of the RREEPDP

| MODULE NAME | MODULE CATEGORY FOR UWE AWARD | MODULE CATEGORY FOR UOB AWARD | LEAD UNIVERSITY | CREDIT POINTS |
|---|---|---|---|---|
| Aerospace Life Cycle and Cost Modeling | Technology | Design | UWE | 10 |
| Aircraft Propulsion | Technology | Aerospace | UoB | 10 |
| Basic Stress Loads | Technology | Aerospace | Wales (UoB) | 10 |
| Customer and Intercultural Awareness | Management | Management | UWE | 10 |
| Excellence Through Project Management (Previously Programme Management) | Management | Management | UoB | 10 |
| Financial Management & Control | Management | Management | UoB | 10 |
| Foundation of Systems Engineering | Technology | Design | UoB | 10 |
| Gas Turbine Materials | Technology | Aerospace | Wales (UoB) | 10 |
| Gas Turbine Performance | Technology | Design | UoB | 10 |
| Holistic Gas Turbine | Technology | Design | UoB | 10 |
| Human Factors in Aerospace Design for Operations | Technology | Design | UWE | 10 |
| People in Organisations (Previously Human Factors in Organisations) | Management/Core | Management | UWE | 10 |
| Introduction to Materials Engineering | Technology | Aerospace | Wales (UoB) | 10 |
| Lean Thinking | Management | Management or Manufacturing | UoB | 10 |
| Manufacturing Systems Engineering | Technology | Manufacturing | UWE | 10 |
| Manufacturing Technology | Technology | Manufacturing | Wales | 10 |
| The Aerospace Design Process: Concept to Compliance | Technology/CORE | Design | UWE | 10 |
| Business Systems Excellence (Previously Total Quality Management) | Management/Core | Management | UWE | 10 |

The following modules are mandatory to obtaining the Postgraduate Certificate (unless you can demonstrate exemption e.g. Cranfield MSc for Holistic Gas Turbine):

- Holistic Gas Turbine 10 credits
- Excellence through Programme Management 10 credits

(NB. All training should be in the context of identified needs and with due consideration of prior learning). If you do not submit the assignments you will be withdrawn from the programme.

## 7.1 Module Outlines

***Important***: Courses are assigned to two levels. Level 2 courses should not be taken until you have a minimum of 1 year's experience of working in company and ideally after 6 months experience in a line role.

More detailed information about each module can be found under Appendix 2 Module Specifications.

### Level 1 Modules:

**Aircraft Propulsion (5 days, 10 credits)**
This module is intended for professional engineers and managers who do not intend to become designers of gas turbines, but need to have a comprehensive knowledge of their performance, design and application. It aims to provide a comprehensive overview of the technical performance characteristics of gas turbines, their relevance to the design of aircraft and helicopters, their operation and support. Upon completion, students should be able to describe basic performance characteristics of engines, understand the thermodynamic principles involved, show a physical understanding of aerodynamic and other factors affecting component performance as well as the effects of engine noise on aircraft performance and operation, and appreciate the requirements relating to mechanical integrity. It is strongly recommended that students take this module prior to Gas Turbine Performance.

**Basic Stress Loads (3 days, 10 credits)**
This module provides a basic understanding of the sources of stress in the major components of gas turbines and their application to component life prediction. It covers static and rotating structures, the relationships between stress and strain conditions and mechanical integrity and the interface between external loads, material of construction, resultant stresses/strains and mechanical performance.

**Excellence through Project Management -Core Module**
**5 days, 10 credits**
The course will introduce and develop the planning and control skills necessary for the successful management of projects. It will cover the principal project management terms and definitions, the role and accountability of the project manager, leadership & teamwork, planning techniques, risk management, work breakdown structures and milestones, budgeting and earned value analysis.

**Financial Management and Control**
**5 days, 10 credits**
The course will introduce the accountant's view of company performance and the engineer's role to support and improve the financial performance of the company. It will cover balance sheets, profit and loss, costing, cost control, budgeting and budget control, credit control and presenting financial information.

**Gas Turbine Materials**
**2 days, 10 credits**
Provides a detailed insight into the current range of materials used in gas turbines and focuses on their performance envelope and limitations. It covers titanium alloys, nickel alloys, steels and composites, their strengths and weaknesses, processing and heat treatment, microstructures and recent advances.

**Gas Turbine Performance**
**13 x 2 hour weekly sessions, 10 credits**
The course provides a detailed understanding of gas turbine performance from both the manufacturer and user standpoints. The course covers cycle selection to suit engine application and engine behaviour under a variety of conditions. Students without thermodynamics (or a similar background) or 3-5 years experience within Rolls-Royce should complete the Holistic Gas Turbine course in advance of this module. Students may want to consider taking the Aircraft Propulsion module prior to this.

**Holistic Gas Turbine Design -Core Module**
**5 days, 10 credits**
A balanced mixture of key point lectures on gas turbine theory supported by a hard calculation engine design exercise that applies the theory to the fundamental performance, aerodynamic and mechanical design of a simple turbofan or intercooled and recuperated marine engine. Lectures build up from fundamental physical explanations based on typical engineering or scientific degree knowledge.

**Introduction to Materials Engineering**
**4 days, 10 credits**
The course provides a comprehensive grounding in materials. It covers the principles of materials selection, mechanical behaviour of materials, solidification, the evolution of microstructure, deformation processes and failure modes.

**Lean Thinking**
**5 days, 10 credits**
The course provides a basic understanding of the techniques of lean thinking and through case studies and discussions with practitioners explores the application of the techniques to the office centred environment as well as to the factory centred environment.

**Manufacturing Systems Engineering**
**5 days, 10 credits**
An introductory overview of the range of functions within a manufacturing system and the inter-relationships involved. Many topics covered will be developed in detail in subsequent specialised modules. This module will provide students with the required understanding of the overall structure and operation of manufacturing systems so that work undertaken in subsequent modules can be set in the correct context. Students will learn to understand the need for co-ordination between a company's business strategy and the manufacturing system it operates. They will also be able to identify the phases of the manufacturing cycle and undertake an evaluation of a manufacturing plant to identify the manufacturing sub-systems present. They will be shown how to effectively use a range of computer-based tools currently used in design, operation and control of manufacturing systems, and understand the relationship between product design and the manufacturing system. This module would be useful before Lean Thinking.

**Manufacturing Technology**
**2 days, 10 credits**
The course provides a basic understanding of the process capabilities of advanced manufacturing techniques. It covers gas turbine manufacturing processes, process selection tools and practical case studies.

## Level 2 Modules:

**Aerospace Life Cycle & Cost Modelling**
**5 days, 10 credits**
This module is intended to provide a detailed understanding of the tools and techniques used for life cycle cost estimation and analysis in the Aerospace industry. It will also give an understanding of how manufacturing costs models can be developed and the importance of architectural and integration issues associated with IT solutions to cost estimation. Research in the area of cost modelling from an international perspective is also covered. On completion, students will, amongst other things, be able to appraise existing costing approaches and recommend improvements, and create cost models that can be enjoyed within industry.

**Customer and Intercultural Awareness**
**4 days, then 1 day later, 10 credits**
The course provides knowledge of the background and functions of a customer company and introduces students to models for understanding and working with multi-national cultural differences. Students will need to attend and submit assignments for *both* the 4 day module at the AirBusiness Academy in Toulouse, plus the 1 day course at Rolls Royce. Each module is equally weighted at 5 credit points each, and both elements need to be passed in order for the full 10 credits to be awarded.

**Foundation of Systems Engineering**
**3 days, then 2 days, 10 credits**
The module enables the broadening of knowledge of systems engineering processes and practices for those working in an increasingly complex environment. It aims to develop a critical systems approach to engineering processes and practices within the wider organisational context.

**Human Factors in Aerospace Design for Operations**
**4 days, 10 credits**
There is increasing concern about how to improve flight safety by reducing the sources of human error. New regulatory requirements are being generated. The aim of this module is to provide an overview of the theories, procedures and practical applications relating to the human factors' approach to aerospace design and operations so that attendees can actively contribute to improvements in flight safety. The module is run over three days, with a 1-day workshop on the fourth day.

**People in Organisations**
**5 days, 10 credits**
This module explores how and why people perform effectively in organisations and demonstrates how and why the organisation of human as well as technical and financial resources contributes directly to organisational success. (Core module for the UWE awards).

**Aerospace Design Process: Concept to Compliance**
**5 days, 10 credits**
This module will enable students to *d*emonstrate the ability to deliver a design solution to a complex problem, whilst improving the*ir* understanding of the sensitivities of each stage of the design process to the overall outcome. Students will be able to plan at a strategic level, using tools which provide metrics to help guide the design process and appropriate approaches to project risk analysis and risk management. They will also know where and how to source specialist information to support design decisions. (Core module for the UWE awards).

**Business Systems Excellence**
**5 days, 10 credits**
This course gives engineers a clear understanding of the approach to Quality adopted by Rolls-Royce and equip them with the tools and techniques necessary to ensure the design and manufacture and delivery of a quality product. (Core module for the UWE awards).

# 8.0 Assessment

To qualify for academic credit a number of study hours must be completed per module. This will comprise pre-course work/reading, attendance of the taught component, post-course reading and tasks, plus an exam or a post-module assignment.

The subject must be assessed to ensure that learning has occurred and understanding is in place. The assessment may be an examination paper or an assignment to be handed in within the prescribed eight weeks. Assignments from the Holistic Gas Turbine module are subject to a viva. Examinations will be on a fixed date afterwards to enable post course study to be completed.

The accredited course tutor will be responsible for the assessment. Participants will receive feedback on their assessment results so that they can develop and improve their skills. As the Company funds this programme, assessment results will be available to the Company.

## 8.1 Regulations for the assessment of modules

## 8.1.1 Assignment Submission

EEPDP students are reminded that Excellence through Project Management and Holistic Gas Turbine are core modules. Rolls-Royce strongly encourages students to submit assignments for both courses. If you do not submit the assignment for the core modules without agreed exemption you will not be able to enrol on any external EEPDP modules and will not gain the Postgraduate Certificate.

Assignments should be submitted directly to the CPDA Office plus an electronic copy emailed to the CPDA office on the submission date:

Postal Address
CPDA Office
83 Woodland Road
Clifton
Bristol. BS8 1US
Email: cpda-pma@bristol.ac.uk

Students are reminded to include the PMA front cover sheet which states their name, the assignment title, the date the module ran, the assignment submission date and the graduate programme they are on plus job title within the company.

The PMA front cover sheet can be found on the EEPDP Website (under useful information & documents):

http://www.infocentre.rollsroyce.com/engineering/pages/your_development/education/eepdp/eepdp_home.htm

However, for the Holistic Gas Turbine module, students should continue to submit directly to the Module Leader, Mr Jim Wickerson.

These requirements ensure that the EEPDP Programme complies with the regulations set out by the partner Universities. EEPDP modules are part of an academic programme and University regulations on assignment and module administration need to be followed.

**8.1.1 Marking**

The regulations for the assessment of the modules are those of the University of Bristol and the University of the West of England. Assignments will be first marked by the Module Leader and a sample will be blind second marked by an appropriate person nominated by the first marker. The two markers will then decide an agreed mark.

The pass mark for post module assignments is 50%. The mark is provisional until approved by the Examination Board, which is held twice yearly in May and October. Provisional marks are given to students immediately following marking and then confirmed following the Examination Boards. The Examination Board reserves the right to change student marks as necessary, although this does not happen very often.

The University of Wales modules have been accredited by the University of Bristol (since 2005/2006). Both marks and credit will count from this date. If these modules were taken before 2005/2006, credit only will be accepted into the CPDA awards.

Students are awarded either a pass or fail for the Postgraduate Certificate; if they have achieved a module average of 70% or more, they will be awarded with a Distinction.

**Note:** All assignments are checked for plagiarism offences. If a possible offence is detected, the universities' plagiarism processes will be invoked and students will be required to follow them.

**8.1.2 Procedure for requesting an extension to a module assignment deadline**

It is the responsibility of the student to meet post-module assignment deadlines. However, the regulations state that students are entitled to apply for an extension, **as long as it is requested at least one week before the deadline** for the module assignment. Students who submit their assignments late without an extension request will automatically have their marks capped to 50% if within a 2 week period after the deadline has passed, or set to 0% if more than 2 weeks after the deadline has passed.

An extension request should give good reasons for the required extra time. Circumstances that are likely to be accepted include:

i. Illness – with a medical certificate submitted;
ii. Bereavement;
iii. Unexpected and overwhelming work pressures, beyond the norm (for example, placements abroad without access to source material).

All extenuating circumstances are reviewed by the relevant Examination Board and a decision is taken as to whether the original mark can be retained as a result. Examination Boards take place in mid May and mid October and, shortly after the meeting, the student will be informed of the mark that they have been awarded for this assignment taking into account these circumstances. Whilst waiting for the extenuating circumstances to be reviewed by the next Examination Board, students are advised to work towards the extension deadline that they have requested. However, they should be warned that there is no guarantee that the extension request will be accepted and the student should accept that it is his/her own risk to request an extension.

If the student has submitted an extension request for which the extenuating circumstances are deemed to be unacceptable, then the initial assignment mark (if passed) will be capped to 50%, if it was handed in within 2 weeks of the deadline. If the extension request is for more than 2 weeks, the assignment mark will be set to 0%.

Extension forms may be obtained from Mel Winfield (mel.winfield@rolls-royce.com). General work commitments will not be accepted as exceptional circumstances and students should be reminded to plan modules appropriately to cater for work commitments. This procedure for requesting an extension is an academic requirement set by the two universities.

The maximum period of time awarded for an extension is up to six months. The Academic Management Committee is required to review the student's status if more than three extensions are requested. The intention is to ensure all parties involved know the commitment students have made and to try to maximise the support given. After a third extension request, the student concerned will be contacted along with his/her Line and Training managers to identify the best way forward.

This allows the CPDA to understand any issues facing students who keep requesting extensions. The Examination Board requires that all students have equal opportunities – too many extensions without proper justification may be unfair to other students.

**8.1.3 Late submissions of assignments**
If the time elapsed from a module is considerably more than the usual two weeks but less than six months, students wishing to submit assignments will be referred by the CPDA Office to the module leader to seek his/her advice regarding the submission of an assignment. The module leader may allow them to do the assignment without further conditions or may want some time to explain any changes made to the module. All cases will be assessed on an individual basis.

If the time elapsed is greater than six months but under two years, the module leader will require the student to attend part of the next running of the module, to ensure the student's skills are up to date. The student can then complete the post module assignment.

If it is more than two years since the student attended the course, he/she would be expected to repeat the whole module to ensure the skills and knowledge are sufficient for both the assignment and the application of the skills into the workplace.

All requests for late submissions should initially be submitted to the CPDA Secretary by submitting an extension form, accompanied by a detailed letter from the student outlining the reasons why the assignment could not be submitted by the deadline specified by the module leader.

**8.1.4 Resubmitting an assignment**
If a student fails an assignment s/he is allowed to resubmit the assignment once. An assignment cannot be resubmitted before the first submission has been seen by an Examination Board. Students will be contacted shortly afterwards with the outcome. If a student needs to resubmit, s/he should contact the Module Leader for verbal feedback on their assignment as soon as s/he receives notification of a fail. The Office will then provide a deadline date for resubmission of the assignment, which will normally be four weeks from the Examination Board. If it is then assessed as a pass, the student will be informed of the new mark achieved but the mark awarded will be officially capped to 50%.

In the event of a second failure, students are given the option to attend the module again or to attend a different module. If the module is attended again, the new submitted assignment will also be capped to 50%, if passed.

It is not recommended that students continue on the Scheme if they have more than two individual module resubmissions. If you reach this position, the CPDA office will contact you and your Training/Line Manager, to discuss the reasons for the repeated low standard. At this point you would need to reconsider your position on the RREEPDP. Both academic and work considerations will be raised at this stage. Students are not automatically removed from the programme if more resubmissions are required. Rather, it is an opportunity for all involved in the individual's career development programme to review and assess progress, to ensure the CPDA / RREEPDP is the correct programme of study for the individual.

**8.1.5 Performance affected by illness or other valid cause**
The markers involved and the Examining Board will act in accordance with the Academic Regulations of the partner universities when considering presentations of extenuating circumstances.

**8.1.6 Application for review**
An application to review a decision made at the Examining Board may only be made in accordance with the partner universities' governing Academic Regulations.

# 9.0 Awards Ceremony

We hold an Awards Ceremony in house, typically after 3 exam boards. Successful students will be presented with an in-house Rolls-Royce Certificate of Achievement for completion of the RREEPDP. Students are invited to this event once their first 60 credits have been validated and approved by the Examining Board and will also receive a Postgraduate Certificate from one of the universities.

# 10.0 Miscellaneous

### 10.1 Sports Facilities

Students based in the Bristol area are able to use the Sport and Exercise Services at both universities. For full details, visit the following websites:

- University of Bristol's Centre for Sport, Exercise and Heath at http://www.bris.ac.uk/sport
- University of the West of England's Sport and Recreation Department at http://www.uwe.ac.uk/sport/.

### 10.2 NUS Cards

Students are enrolled onto a University programme, so are eligible to apply for a National Student Card. Please contact the CPDA Secretary to find further details.

# APPENDIX 1

## Post Module Assignment – Notes for students

**Introduction**
The post-module assignment is designed as the educational extension to a given module. During the module the aim is to become familiar and understand a specific body of knowledge, whilst identifying the techniques of its application within the Aerospace Industry. The post-module assignment is to enable the student to build his / her own confidence in the techniques and application of knowledge to indicate to the Module Leader whether the module learning objectives have been met.

With respect to the RREEPDP programme, the post module assignment is used as part of the continuous assessment of the taught course work.

Everyone involved in the RREEPDP programme has achieved a good level of academic qualification before enrolment and should be able to write good reports. The following is aimed at ensuring the reports are consistent and to the Certificate level standard.

**Assignment Specification**
The Specification for the assignment will be provided at the beginning of or during the module, so that if you have any questions regarding it you can discuss them with the module leader.

**Time and Length**
The recommended effort to be put into the assignment is between 50-60 hours of work - this includes preliminary research work. This may vary according to the amount of experience the student has in the particular area of study. However, it is necessary to remember that it is the quality of the work that is important. Assignment length depends on the module and particular assignment set, however, for essay-type questions students are expected to write approximately 3000 to 5000 words excluding any charts, diagrams, tables or other additional material.

Some students in the past have submitted assignments which have been unnecessarily long. Markers will often deduct marks for excessive length so you should try to provide thorough yet concise work. Do answer the actual question set and make sure that you follow a logical argument - ensure that you - as a bare minimum - have an introduction, middle and end. References should be provided where necessary and a relevant bibliography always impresses markers. Page numbering and correct spelling (!) are also basics which unfortunately stand out if incorrect.

**Objectives**
The following objectives should help the student to submit an assignment of satisfactory quality.

The post module assignment should demonstrate to the Module Leader that the student:

- Has correctly interpreted the assignment;
- Is reasonably familiar with the body of knowledge covered in the module;
- Has mastered the application of this knowledge;
- Can communicate this application;
- Can critically assess any constraints and limitations during the application of this knowledge and discuss them coherently.

The work submitted should be in a neat and presentable form:

- The post-module assignment should be written, printed or typed on one side of A4 paper;
- The pages are numbered and there is a contents list;
- There is a cover page, with student's name, company, module title and running dates, plus a disclaimer if desired and a copy of the assignment question answered;
- There is an executive summary of no more than half a page of A4, setting out the key points of the assignment.

**Good practice in Academic Writing**

To meet standard requirements for a good report, students must show:

- Knowledge of the target audience – identify the recipient(s) and write the report to suit;
- The object of the report is to communicate effectively and accurately what has been done, plus the results and conclusions obtained.

- The report should be clear and concise – long-winded paragraphs should be reread and rewritten before submission.
- It is the author's responsibility to ensure the report communicates the correct information.

Use of sources – how to find and use materials:
Sources include academic journals, websites, conference proceedings, periodical, data tables, etc. It is very important to show that the claims of other authors can be understood and critically evaluated – it is part of mastering the subject matter. Module Leaders often suggest reference sources and these in turn can lead to further sources. Anything used in the report should be correctly referenced.

Citation of Sources – how to refer to the work of others:
Any ideas or text that are not the author's own must be acknowledged as being from somewhere else, and it must be clearly stated from where they have been obtained. Note that sources should only be referenced if consulted first-hand. If a paper is referred to within another article, it is the covering article that should be referenced, unless the paper has also been read.

Good style – how to use English clearly and effectively:
An academic report must conform to accepted conventions. These have been developed to help express views and arguments clearly, cogently and effectively, helping the reader understand the content and structure of the piece. They include:

- A well-planned, structured essay;
- The correct use of other sources;
- Good use of English.

Plagiarism – how to avoid it!
Plagiarism means 'representing the words or ideas of someone else as if they were your own' – and is totally illegitimate in all academic and professional institutions. Failure to acknowledge work of another is discourteous, whilst showing an apparent lack of ideas or thought on the plagiariser's part. **The penalties at both the University of the West of England and the University of Bristol are very severe if plagiarism occurs.** Students are required to submit an electronic copy of their assignment to the cpda-pma@bristol.ac.uk email address in order that checks can be made for plagiarism, by the same deadline that is set for the paper copies.

**Layout**
A general rule of thumb is to have sections similar to the following within an assignment report (this is neither exhaustive or prescriptive; but ensure the sections are logical):

a) The Summary
b) The Main Text
    i. Introduction
    ii. Theory, including literature review
    iii. Methodology used to obtain results
    iv. Results and Discussion
    v. Conclusions and Recommendations
c) References (either identified in the main text or listed after the conclusions)
d) Appendices

**Further Information**
Contact the libraries of both the University of Bristol and the University of the West of England for useful reference books.
The UWE web site also contains useful information: www.uwe.ac.uk/library/resources/general/info_study_skills/

including a very good guide to referencing, using the Harvard System. This is recommended as one of the best ways of referencing and can be found by using the above website, clicking on the 'Referencing' section. It is also given in British Standard BS 5605:1990.

In addition, the following British Standard is helpful:

*Recommendations for the Presentation of Theses and Dissertations*. BS 4821 London: British Standards Institute, 1990 ISBN 0-580-17813-7

Guidance on style and use of English can be found on a website produced by the University of Toronto:

www.utoronto.ca/writing/advise.html#6

Information existing within the Faculties supporting the CPDA can be found (note that much of the above document has been taken from the following – this is a guidance note and not a formal report!):

i. Ryrie, Stephen, *Good Practice in Academic Writing*. Faculty of Computing, Engineering & Mathematical Sciences, University of the West of England, 2002
ii. *Some Notes on the Writing of Reports*, Department of Aerospace Engineering, University of Bristol, 2000
iii. Hempsell, C.M. *Some Notes on Technical Writing* Issue 1, Department of Aerospace Engineering, University of Bristol, 2002

Also useful:

i. *Guidelines for Post Module Work*, Department of Engineering, University of Warwick (no date or further reference available).
ii. *Beginning Research in Psychology,* C Dyer, Blackwell

**Sensitive data/Confidentiality**

If an assignment contains sensitive information it is advisable to include a separate appendix stating this. All assignments are looked at solely for the purposes of assessment. Occasionally, module leaders or another academic involved in the module may ask for a copy of an assignment. Permission from the student will always be sought for this. Assignments are marked by two markers, as well as the External Examiners at the Exam Board. Provided the CPDA Office is informed that the work is confidential, no one else will have access to the assessment.

**Conclusion**

On all modules, students should listen to what the Module Leader is looking for in the Post-Module Assignment. In most cases, the Module Leaders have a very clear idea of what they want to see and will communicate this during the module week. If no guidance is given by the Module Leader, the above should help.

Above all, common sense should be used. The report should be written to make sense and communicate results and conclusions. Always bear this in mind and report writing becomes second nature.

**Submission of the Post Module Assignment**

The date for handing in an assignment is set on the last day of the module and is usually on the Monday following the Friday 8 weeks from that date. This may vary over seasonal holidays where extra time is usually given. Unless otherwise informed, two hard copies of the assignment must be sent/handed directly to **Mel Winfield ML-27, Engineering & Technology Human Resources Department at Rolls-Royce Plc, Derby (email: mel.winfield@rolls-royce.com)** by 5pm on the day of the deadline, and an electronic copy must also be sent to cpda-pma@bristol.ac.uk.

Students are advised to keep a copy of their assignment as they will not be returned. Following the Exam Board, students will be sent a copy of their feedback sheets detailing the markers comments. Students who have failed an assignment will be sent feedback immediately in order that they can put this to good use during the resubmission. The marking procedure normally takes about eight weeks.

# APPENDIX 2

## Module Specifications

LEVEL 1 MODULES

**Aircraft Propulsion**
**10 Credits**
**Level 1**

**Technology** – University of the West of England
**Aerospace** – Bristol University
**N/A** – Newcastle University

**Aim:**
This module aims to provide a comprehensive overview of the technical performance characteristics of gas turbines, their relevance to the design and manufacture and the impact on the design, operation and support of aircraft and helicopters.

**Learning Outcomes:**
On completion of the module, students will be able to:-

- Describe the basic performance characteristics of engines relevant to the performance of the aircraft or helicopters which they power
- Understand the thermodynamic principles involved
- Show a physical understanding of the aerodynamic and other factors affecting component performance
- Predict the performance of turbofan engines away from the design points
- Understand the effects of engine choice on aircraft/helicopters performance, operation, maintenance and noise
- Appreciate the requirements relating to mechanical integrity, rig and component testing and certification

**Target Students:**
This module is intended for professional engineers and managers who do not intend to become designers of gas turbines but need to have a comprehensive knowledge of their performance, design and applications. Students should have an engineering or science degree, or equivalent. They should also have completed CPDA Module 'Introduction to Aeronautics' or equivalent, or have covered the principles of thermodynamics in a previous educational qualification.

**Learning Environment:**
Material is presented in lectures, case studies and demonstrations, with a number of expert evening speakers making presentations. The emphasis will be mainly on descriptive analysis and demonstration.

**Pre-Module Study:**
Students will be provided with pre-module reading and revision notes on the laws of thermodynamics.

**Post-Module Assignment:**
Students will be set an assignment relating to company business objectives, preferably in the area in which the student is working.

**Venue:**
University of Bristol

**Module Leader:**

Mr Sandy Mitchell, Department of Aerospace Engineering, University of Bristol
Tel: 0117 954 9727; Email n.a.Mitchell@bristol.ac.uk

**Basic Stress Loads**
**10 credits**
**Level 1**

**Technology** – University of the West of England
Aerospace – Bristol University
**N/A** – Newcastle University

**Of benefit to:**
New/recent starters and engineers who require a revision of the basic principles involved in basic stress/loads. Engineers who need to have an understanding/awareness of the basic principles of stress/loads aspects of gas turbine engines.

**Objectives:**
- To understand/revise basic theory and principles involved in stress analysis and loads sources/derivation.
- To provide knowledge of basic stress/loads aspects and considerations involved in the various major components of gas turbine engines.
- To provide necessary stress/loads background and appreciation for personnel involved with Gas Turbine Engineering, particularly Mechanical integrity aspects.

**Course content:**
Basic stress - direct, bending, shear, elastic/plastic behaviour, creep, elastic instability, failure modes and criteria - ultimate and proof strength - high and low cycle fatigue, stress concentrations, principle stress, biaxiality, sources of stress - pressure load, rotation, thermally induced, "g" and gyro, basic vibration ideas - natural frequencies/sources of excitation - avoidance of resonance, means of changing natural frequency.
Whole engine concerns - mounting, whole engine structure, shaft whirl, balancing rotating components and assemblies.
Loading: "g" and gyro, thrust, component thrusts/drag.
Casings - loading - pressure and end loads plus engine structural loads.
Avoidance of permanent set - margin against set and failure, stress concentrations - holes, bossing around holes.
Blade containment. Bolted joints, torque tightening, low cycle fatigue of bolts in a bolted structure.
Vibration - excitation, engine orders - response, natural frequencies, various mode shapes, avoidance of running range resonance's, snubbers, interlocking shrouds, dampers.
Blades - loading - CF, pressure, thermal - stacking, stress balancing, stress concentrations, root fixing, cooling holes.
Discs - loading - rim load, CF, pressure, thermal, mean hoop stress, neck radial stress, free ring hoop stress, rim balance, design against permanent set, overspeed burst. Low cycle fatigue - stress concentration features, critical areas, cob centre transient thermal, life estimation/prediction.
Vibration - bladed disc modes.
Shafts - loading - torque, CF, end load, design against permanent twist, low cycle fatigue, stress concentrations, life prediction, shaft whirl (whole engine).

**Method:** Lectures.

**Assessment:** 5 Credits can be obtained through a 2-hour Exam where students will have to complete 3 out of 5 questions based on the coursework. They will also be required to carry out a 'mini-assignment (2500-3000 words) which has to be handed in at the written exam. In order to gain a further 5 credits, students have the opportunity to complete a post module assignment.

**Course deliverer:** Prof John Evans, University of Wales, Swansea
Email: w.j.evans@swansea.ac.uk

**Venue:** On-site training venues.

**Duration:** 3 days.

**Excellence Through Project Management**
**10 Credits**
**Level 1**

**Management** – University of the West of England
**Management** – Bristol University

**Aims**
To give students an integrated view of, and training in, how to get any work done more effectively by the application of Programme Management principles.

**Objectives**
1. An understanding of how the separate elements of work interrelate.
2. An understanding of how to apply Programme management, and other, principles to all work within the business.
3. An opportunity to practise those principles against the clock.
4. A view of work from other people's perspectives.
5. Evidence of how well integrated work can reduce costs and increase return on investment.

**Duration**
5 days

**Student Applicability**
The course will directly benefit anyone whose job entails managing resources to accomplish a specific piece of work by an agreed date and within an agreed budget.
Students who have / will have real life Control Account Manager or Programme Manager roles will find the course especially invaluable.

**Format**
Lectures (40% time) by course director integrated with the playing of a sophisticated computer-based programme management simulation (60% time). Teams of students facilitated by training professionals play this simulation (often referred to as "The Game") and as a training tool, is low risk to encourage students to learn from their mistakes. "The Game" dispenses rewards and penalties to encourage optimum behaviour and is made "real" by means of role-playing. Both "The Game" and the lecture material are available in a choice of 3 "process languages":

- "Customer Business" for marketing/sales/commercial students
- "Design/Make" for engineering / product development students
- "Aftercare" for service/customer/product support students

To embed their newly acquired knowledge students will contribute to an end-of-course presentation of what they have learned.

HEALTH WARNING - "The Game" is addictive!

**Module Leader**
John Gentle, Rolls-Royce Plc

**Academic Supervisor**
Mr Mike Breward, University of Bristol

**Site Availability**
Derby, Bristol, Indianapolis

**Financial Management and Control**
**10 credits**
**Level 1**

**Management** – University of the West of England
**Management** – Bristol University
**Marine Technology** – Newcastle University

**Students:**
People with a degree in Science or Engineering or HNC/HND plus relevant industrial experience.

**Module outline:**
Attendees will acquire a basic understanding of primary financial accounts, costing, investment appraisal, and budgetary control. They will also understand the manager's role in these processes and how they can judge performance using ratios.

**Course content:**
- Primary financial statements: cash flow, profit & loss accounts and balance sheets; the nature and justification for the concept of profit, and the implications of creative accounting.
- Performance Indicators: quantitative and qualitative; financial & non-financial; key model; the balanced scorecard.
- Management information for decision-making: budgetary processes and systems, variance analysis, flexible budgeting; costing for long term and short-term, cost behaviour, cost/volume/profit analysis break-even analysis.
- The financial consequences of decision-making such as the financial impacts of various alternative sources of debt and equity finance.
- The principles of investment appraisal, comparison of alternative methods of investment appraisal.
- Business Simulation Exercise
- Application of course concepts to Rolls Royce business

**Assessment:**
The assessment for this module is through a post module assignment. Full details of the assignment will be given during the module.

**Method:** Lectures, presentations and case studies

**Course deliverer:** Mr Peter Gray, Engineering Management Group, University of Bristol.
Email: Petert.Gray@tesco.net

**Venue:** On site training establishments or University of Bristol

**Duration:** 5 days

**Gas Turbine Materials**
**10 credits**
**Level 1**

**Technology** – University of the West of England
**Aerospace** – Bristol University
**N/A** – Newcastle University

**Target Students:**
Aerospace engineers and managers who have a direct or peripheral need to understand materials selection and performance.

**Aim:**
A detailed insight into the current range of materials used in gas turbines focusing on their performance envelope and limitations.

**Learning Outcomes:**
On successful completion of the 3 day module, students will:-

- Appreciate the strength and weaknesses of the current portfolio of titanium alloys, nickel alloys, steels and composite materials.
- Understand the background to the processing and heat treatment schedules required for these materials.
- Understand the relevance of the different microstructures in the alloys
- Know the basis on which the most appropriate materials is selected for a specific duty.
- Appreciate the critical material properties for specific gas turbine applications.
    - Be aware of recent advances in materials technology.

**Assessment:** 5 Credits can be obtained through a 2-hour Exam where students will have to complete 3 out of 5 questions based on the coursework. They will also be required to carry out a 'mini-assignment (2500-3000 words) which has to be handed in at the written exam. In order to gain a further 5 credits, students have the opportunity to complete a post module assignment.

**Module Content:** The units on titanium alloys, nickel alloys and steels will cover the following: The Materials and their alloying Elements (*physical properties, alloy types, USE/UK perspective),* Processing, Heat Treatment, Microstructure *(Processing options, Microstructural control and constituents),* Design for Strength, Toughness, Fatigue, Creep, Environment *(Proof strengths, UTS, Fracture Toughness, Fatigue crack initiation and propagation, Creep deformation and fracture, Single and poly-crystals, optimising alloying elements and microstructure),* Composite Materials *(Manufacturing routes, fibre, matrix, interface, mechanisms of reinforcement, mechanical properties),* Advanced materials engineering *(metal matrix composites, aluminides, composite structures),* Components and properties.

**Method:** Interactive lectures, group discussions, case studies and worked examples.

**Course Leader**: Professor John Evans, University of Wales, Swansea
Email: w.j.evans@swansea.ac.uk

**Venue:** On-site training venues

**Duration: 3** days

**Gas Turbine Performance**
**10 Credits**
**Level 1**

**Technology** – University of the West of England
**Design** – Bristol University
**N/A** – Newcastle University

**Of benefit to:**
Technologists from a wide range of disciplines whose work is related to whole engine or component performance. Aimed at graduate engineers who already have a knowledge of basic physical principles and an understanding of the overall gas turbine design process. The course provides a balanced look at all aspects of gas turbine performance and its application. Students with no thermodynamics or similar background or 3-5 years experience within Rolls-Royce should complete the Holistic Gas Turbine module in advance of this course. Students may also want to consider taking the Aircraft Propulsion module prior to this one.

**Pre and Post Course Reading:**

| | | |
|---|---|---|
| The Jet Engine | | Rolls Royce plc. 0-902121 2 35 |
| Jet Propulsion | Cumpsty | CUP 0-521-59220-1 |
| Gas Turbine Performance | Walsh & Fletcher | Blackwell Science 0-632-04874-3* |
| Gas Turbine Theory | Cohen, Roger & Saravanamutto | Longman 0-582-23632-0 |
| Jet Engines | Nunecke | Airlife 1-85310834-0 |

*Walsh & Fletcher is available on the Rolls-Royce intranet

**Objectives:**
On completion of this course the student will have a full understanding of Gas Turbine Performance. They will have demonstrated their understanding of the following:

- Steady state design and off-design performance and integration with customer requirements.
- Performance and engine modelling at component level
- Engine starting, transient operation and control requirements
- Requirements for engine validation, verification and compliance testing, covering test facilities, instrumentation, test techniques, analysis, diagnosis and prediction and use of materials.

**Method:**
Lectures and worked examples.

**Course deliverer:**
Pratap Nayer & others R-R Derby; Email: Pratap.Nayer@rolls-royce.com
Richard Tunstall, R-R Bristol; Email: Richard.Tunstall@Rolls-Royce.com

**Venue:**
On site training venues

**Duration:**
Derby : 13 x 2 hour **morning** lectures at weekly intervals
Bristol : 14 x half days over 14 weeks

**Holistic Gas Turbine Design**
**10 credits**
**Level 1**

**Technology** – University of the West of England
**Design** – Bristol University
**Marine Technology** – Newcastle University

**Who should attend:**
This course is designed for technical graduates. Lectures build up from fundamental physical explanations but do assume a technical degree background.

**Preparation if required:**
Prior to the 5 day "Intermediate" Holistic Gas Turbine course there is an optional 1 day "Basic" Holistic Gas Turbine course. Some technical people attend the Basic course first, but there is no need to do so.

**Training Outline:**
The full range of gas turbine theory is covered by concise lectures at a balanced level of detail, supported by just 100 key point slides and half-page notes. The theory is applied by coursework exercises and an engine design exercise. The engine design exercise takes up about 30% of the course time. Fundamental performance, aerodynamic and mechanical calculations are applied to the design of a simple turbofan or an intercooled recuperated marine engine. Topics are illustrated by case studies from current and historical engines, and engine test videos and engine bits.

**Post course reading and study:**

| | |
|---|---|
| The Jet Engine | Rolls-Royce |
| Jet Propulsion | Cumpsty |
| Gas Turbine Performance | Walsh and Fletcher |

On completion of the 5 day course, there is an "Advanced" 2 day course that takes the engine design calculations further, but this is not part of the RREEPDP. Students are expected to take part in a viva, as well as submitting a post module assignment.

**Method:**
Lectures and group and individual exercises.

**Course deliverer:**
Jim Wickerson – R-R Derby Email: jim.wickerson@rolls-royce.com
Dave Dryall – R-R Bristol Email: DaveDryell@blueyonder.co.uk

**Venue:**
Company training centres

**Duration:**
5 days

**Introduction to Materials Engineering**
**10 credits**
**Level 1**

**Technology** – University of the West of England
**Aerospace** – Bristol University
**N/A** – Newcastle University

**Of benefit to:**
Those who in the course of their work need to obtain an adequate knowledge of Materials Engineering necessary for a full understanding of the selection, behaviour and properties of materials.
Those who need an adequate foundation knowledge as a pre-requisite for attendance of other material/material behaviour modules.

**Objectives:**
To obtain knowledge of the principles and concepts of Materials Engineering essential for a full understanding of the selection, behaviour and properties of materials.
To obtain an adequate foundation knowledge necessary for a full understanding of other (generally 1 day) material/material behaviour modules.

**Course content:**

**Principles of materials selection**
Introducing codes, specifications and design requirements for structural applications.
**Mechanical behaviour of materials**
Including stresses and strains in solids, elastic behaviour, tensile testing, testing in compression, true stress/true strain curves, toughness, hardness, etc.
**Structure of materials**
Including atomic numbers and weights, electron structure of atoms, primary and secondary bonding, crystal structure of metals, crystal structure of ceramics and glass, structure of polymers, introduction to composites.
**Solidification**
Including nucleation and growth, structure of grain boundaries, grain structures during casting.
**Vacancies and diffusion**
Including Fick's laws, mechanisms of diffusion, structure-sensitive diffusion.
**Microstructure of solids**
Including the phase rule, solid solubility, eutectics, complex phase diagrams.
**Deformation processes in crystals**
Including slip planes and directions, critical resolved shear stress, theoretical shear stress, the concept of dislocations, deformation of polycrystals, recrystallization and grain growth, solid solution strengthening, precipitation hardening, ductile and brittle failure, crack propagation, fracture toughness, introduction to fatigue and creep.

**Method:** Lectures.

**Course deliverer:** Prof Brian Wilshire, University of Wales, Swansea
Email: b.wilshire@swansea.ac.uk

**Venue:** On site training venues

**Duration:** 4 days

**Lean Thinking**
**10 credits**
**Level 1**

**Management** – University of the West of England
**Management/Manufacturing** – Bristol University
**Marine Technology** – Newcastle University

**What this course offers:**
An understanding of Lean tools and techniques. The ability to apply them to your working processes and practices.

**Who should attend:**
EEPDP students and anyone requiring a thorough introduction to lean thinking tools and techniques. This course contains more theory and takes a more analytical approach than the Lean Practitioner course on which it is based.

**Pre-requisites:**
Read through the background information on the company 'Plastic Parts Limited'

**Post course reading:**
The Lean Toolbox 2nd edition John Bicheno
Lean Thinking Womack and Jones

**Course Content:**
Introduction to lean from the early days of the craftsman to today's best practice
Simulation 4 runs during the course
Analytical tools
Teamworking
Control of processes
Business measures
Strategy

**Change Management**
Process improvement tools e.g. 5S
Design for manufacture and assembly

**Method:** Lectures interspersed with a business improvement simulation 'Plastic Parts Limited'

**Course deliverer:** Bob Hawke R-R Derby
Email: Robert.Hawke@rolls-royce.com

**Venue:** On site training venues

**Duration:** 5 days

**Manufacturing Systems Engineering**
**10 Credits**
**Level 1**

**Technology** – University of the West of England
**Manufacturing** – Bristol University
**N/A** – Newcastle University

**Aim:**
The module aims to provide an introductory overview of the range of functions within a manufacturing system and the inter-relationships involved. The module builds upon the material developed in the CPDA module M1 Aircraft Manufacture and Assembly and looks at the issues relating to volume and repetitive manufacturing.

**Learning Outcomes:**

On completion of the module, students will be able to:

- Understand the need for co-ordination between the business strategy of the company and its manufacturing system
- Identify and understand the phases of the manufacturing cycle
- Undertake an evaluation of a manufacturing plant to identify the sub-systems present
- Identify a range of computer-based tools currently used in the design, operation and control of manufacturing systems
- Understand the relationship between product design and the manufacturing system

**Target Students:**
The module has been designed for graduates of various disciplines who require an overview and understanding of manufacturing to complement their own activity, or who wish to embark on a career in manufacturing management. It is also aimed at managers and engineers who wish to formalise their understanding of manufacturing systems.

**Learning Environment:**
A combination of lectures and case studies will be employed. Extensive use will be made of a computer based simulation package during the week which will be used by students to tackle a case study that will integrate the topics developed during the week. There will also be a visit to a manufacturing company to see first hand implementations of the course material supported by industrially based experts.

**Pre-Module Study:**
Students will undertake a package of reading, case study preparation and work-based information gathering (approximately 10 hours of study).

**Post-Module Assignment:**
Students will have an assignment within their company aimed at reviewing current practices and organisation, requiring the writing of a report of approximately 2,500 words.

**Venue:**
Engineers House, Bristol

**Module Leader:**
Dr John Lanham, Faculty of CEMS, University of the West of England.
Tel: 0117 328-2474; Email John.lanham@uwe.ac.uk

**Manufacturing Technology**
**10 credits**
**Level 1**

**Technology** – University of the West of England
**Manufacturing** – Bristol University
**N/A** – Newcastle University

**Of benefit to:**
Those who in the course of their work need to obtain an adequate knowledge of Materials Engineering aspects of manufacturing technology.

**Objectives:**
The intention of the course is to provide an introduction to the methods of manufacture of the types of components used in gas turbines. It describes the purposes of fabrication processes and categorises the various approaches that are possible. General casting methods are discussed as well as bulk forming and sheet forming procedures. Metal addition (welding and joining) is described as well as metal removal (machining). Powder metallurgy routes are included. Particular emphasis is placed on the control of metallurgical structure through special casting techniques and thermo-mechanical processing. The course includes a brief description of process models and their use in optimising metal usage and efficient manufacture of components with specified mechanical properties. Case studies include the forging of compressor discs and the casing of DS and single crystal turbine blades.

**Course content:**
1. Discussion of the purposes of manufacture. Classification of processes and the importance of quality.

2. Overview of casting technology including ingot production, metal refinement and shape casting. Specialised casting procedures including die casting, investment casting and other expendable mould casting processes.

3. Particulate technology including metal powder production, pressing sintering and other consolidation processes.

4. Bulk forming including rolling, forging and extrusion.

5. Sheet metal forming including drawing, stretching and bending. A discussion of superplastic sheet metal forming.

6. Theory of machining including a description of basic removal processes and tool materials. High speed machining, grinding and electro-chemical processes.

7. The control of microstructure and quality. Grain refiners and the principals of thermo-mechanical processing.

8. The elements of process modelling and its use in optimisation.

9. Case studies 9a. Production of a disc in a titanium alloy
   9b. Single crystal turbine blades in a superalloy

**Method:** Lectures.

**Assessment:** 5 credits can be obtained through a 2-hour Exam where students will have to complete 3 out of 5 questions based on the coursework. They will also be required to carry out a 'mini-assignment (2500-3000 words) which has to be handed in at the written exam. In order to gain a further 5 credits, students have the opportunity to complete a post module assignment.

**Course deliverer:** Prof Brian Wilshire, University of Wales, Swansea
Email: b.wilshire@swansea.ac.uk

**Venue:** On site training venues.

**Duration:** 2 days.

LEVEL 2 MODULES

**Aerospace Life Cycle and Cost Modelling**
**10 Credits**
**Level 2**

**Technology** – University of the West of England
**Design** – Bristol University
**N/A** – Newcastle University

**Aim:**
An overview of research in the area of cost modelling from an international perspective

This module is intended to provide the following:

- A detailed understanding of the tools and techniques used for life cycle cost estimation and analysis in the Aerospace industry
- An illustration of how these tools and techniques are used through the use of case studies
- An understanding of how manufacturing costs models can be developed and the importance of architectural and integration issues associated with IT solutions to cost estimation
- 'Hands on' use of tools and techniques

**Learning Outcomes:**
On completion of the module and the attendant assessment, students will be able to:

- Critically appraise existing costing approaches and recommend improvements
- Create robust, elegant, rational, auditable and expandable cost models that can be enjoyed within industry
- Confidently defend and justify costing conventions and philosophies employed
- Define the requirements for a company costing system at a systems level
- Evaluate commercial costing tools and be able to define integration requirements
- Plan and manage 'high-level' business/ERP systems implementation and integration requirements. This will provide cost data from the early design stage through to detailed manufacturing costing

**Target Students:**
This module is intended for managers and engineers who wish to formalise their understanding of the need for life cycle analysis and cost modelling.

**Learning Environment:**
Much use is made of case studies & applied research. A very high proportion of the module delivery will involve 'hands on' use of techniques & tools. Industry speakers from a variety of aerospace organisations will contribute to the module.

**Pre-Module Study:**
Students will be sent a study pack which will include the latest applied research in the disciplines concerned.

**Post-Module Assignment:**
The students will be given a wide choice of assignment topics based on applying the tools and techniques delivered during the week. The emphasis will be on applying these techniques in a realistic work environment in such a way that the sponsoring company can benefit from the assignment effort. Students will be given support and advice after the module on how to tackle the assignment they have chosen.

**Venue:**
Engineers House, Bristol

**Module Leader:**
Robert Marsh, University of the West of England
Email: Robert.Marsh@uwe.ac.uk

**Customer & Intercultural Awareness (Airbusiness Academy)**
**10 Credits,**
**Level 2**

**Management** – University of the West of England
**Management** – Bristol University
**N/A** – Newcastle University

**Objectives:**
This course was developed to:
- Provide a better understanding of Airbus and the business environment
- Give participants a chance to visit several of the aerospace industry sites in Toulouse.
- Establish a customer focused mentality
- Raise cultural awareness.

**Content:**
**Series of presentations**
- **Airbus:**
  - Airbus history
  - Present organisation & challenges
  - Powerplant procurement
  - Powerplant product support
- **Aircraft Market and Competition:**
  - Forecasting world demand for commercial aircraft
  - Understanding the market
- **The Airline viewpoint:**
  - Airline operations
  - Understanding passenger needs
  - Airline expectations when selecting aircraft
- **Customer Awareness:**
  - Serving both the airline and the air framer: From an engine manufacturer's viewpoint
- **Airbus Military Company:**
  - Marketing environment & aircraft configuration
  - Programme organisation
  - Marketing aspects (military compared to civil conditions)
- **Intercultural Awareness:**
  - Definition of culture and its impact on the workplace
  - Exploring cultural perceptions and differences
  - Intercultural variables
  - Analysing intercultural cases
- **Industry visits:**
  - **Final Assembly Line**, Airbus, St Martin du Touch site
  - **Goodrich Aerospace Europe & Hurel Hispano** – Engine nacelle podding facilities.
  - **Pylon Manufacturing/Assembly** Airbus, St. Eloi plant *(Optional).*
- **Evening dinner including:**
  - Tour of Toulouse
  - Guest speaker from the Rolls-Royce office, Toulouse

**University Links:**
After the course, students may submit a 2000 – 3000 word assignment on the subject of intercultural awareness.

**Who should attend:**
Newly recruited graduates and other Rolls-Royce personnel.
General information: Group Size : 15 – 20 students.

**Assessment:** Students are required to undertake two equally weighted post-module assignments, one relating to the customer focus of the module and the other to the intercultural focus. The first piece will be issued in the initial one-day session, and the second in the subsequent four-day session. Students need to pass both assignments to pass the module and gain the 10 credits. For both pieces, a general brief will be provided by the tutor, but the student should then tailor the assignment, in consultation if possible with their manager, so that it is relevant to their own organisation.

**Contact:** Wendy Brooks, Course Manager, wendy.brooks@airbusiness-academy.com

**Duration:** 1 day in Derby, presented by Ian Beeson (Email: Ian.Beeson@uwe.ac.uk), Faculty of BIT, UWE, Bristol and a further 4 days at Airbusiness Academy in Toulouse.

**Foundation of Systems Engineering**
**10 credits**
**Level 2**

**Technology** – University of the West of England
**Design** – Bristol University
**Marine Technology** – N/A

**Students:**
Graduate level engineers and managers working in an increasingly complex environment who need to broaden their knowledge of systems engineering processes and practices.

**Module outline:**
To develop a critical systems approach to engineering processes and practices within the wider organisational context.

**Course content:**
*Issues and problems in current engineering practice:* successes and failures in large engineering projects; cost and timescale overrun and quality shortfall; team structures; communities of practice in engineering; scope and use of development and management methodologies.

*Organisational context:* engineering socio-technical systems; strategies for process improvement; the role of standard process models; human factors in the adoption of new techniques; organisational models and architectures; managing change.

*Holistic systems engineering:* scope of systems from engineering artefacts to human activity systems and complex socio-technical domains; systems thinking principles; lifecycle from problem formulation through design and manufacturing to maintenance and disposal; problem domain analysis; soft systems methods; systems dynamics.

*Systematic systems engineering:* user requirements elicitation; requirements validation and verification, derived and system requirements; system modelling and system modelling languages; model-driven development; risk analysis; validation and verification tools; configuration management; system integration; modelling and engineering organisational work structures and flows.

**Pre-module study:**
A set of readings and a case study.

**Assessment:**
Students will be assigned a project involving a specific and agreed application within their workplace or such other project as may be appropriate.

**Method:**
This module is delivered as a 3-day block and a 2-day block, with a 2-week break in-between. The first element of assessment is carried out in the 2-week break and the second follows the end of the teaching. Teaching will use a mixture of lectures, invited industrial speakers, workshops, discussions and student presentations.

**Course deliverer:**
Mr. Chris Wallace, Faculty of BIT, University of the West of England, Bristol
Email: Chris.Wallace@uwe.ac.uk; Tel: 0117 3283165

**Venue:** Engineers House, Clifton, Bristol (to be confirmed)

**Duration:** 5 days

**Human Factors in Aerospace Design for Operations**
**10 Credits**
**Level 2**

**Technology** – University of the West of England
**Design** – Bristol University
**N/A** – Newcastle University

**Aim:**
There is increasing concern about how to improve flight safety by reducing the sources of human error. New regulatory requirements are being generated. The aim of this module is to provide an overview of the theories, procedures and practical applications relating to the human factors' approach to aerospace design and operations so that attendees can actively contribute to improvements in flight safety.

**Learning Outcomes:**
On completion of this module students will be able to:

- Demonstrate awareness of the importance of aerospace human factors research and applications;
- Understand the relationship of human factors to operational research, ergonomics, human computer interface (HCI) and human reliability analysis (HRA) relating to the flight deck, maintenance, production and operation.
- Recognise the logic of human factors analysis in organisational safety, design, regulation, evaluation and test, certification, maintenance and design organisation management;
- Appreciate the concept of a socio-technical system and its associated safety parameters;
- Apply the concept of safety culture and evaluate its applications in safety management;

Integrate various human factors perspectives in applications for aerospace systems engineering

**Target Students:**
Managers and task leaders charged with safety management responsibilities within aerospace manufacturing companies; military and civilian operators; aerospace design and systems engineers; certification surveyors, flight & ground crews, and flight-test personnel.

**Learning Environment:**
The module will be run as a 3-day intensive course followed by a one-day seminar/workshop the following day. It will normally include presentations by academics, industry safety specialists, human factors' specialists from industry, the CAA, and airline personnel involved in safety management and CRM training, with simulations and practical exercises.

**Pre-Module Study:**
Students will be assigned 10 hours preparatory reading and preparation including case studies.

**Post-Module Assignment:**
Students will be asked to complete a project linked to a human factors issue in design or operations in their own company or organisation, and will present the results of their investigation at the workshop.

**Venue:**
Engineers House, Bristol

**Module Leader:**
Prof. Philip Lawrence, Director Aerospace Research Centre (ARC), UWE Bristol
Tel: 0117344 3630; Email philip.lawrence@uwe.ac.uk

**People In Organisations**
**10 credits**
**Level 2**

**Core/Management** – University of the West of England
**Management** – Bristol University
**N/A** – Newcastle University

**Students:**
This module is designed primarily for graduate engineers who have limited experience at a supervisory or managerial level. It is also suitable for more experienced staff who need an introduction to the subject.

**Course outline:**
This module explores how and why people perform effectively in organisations and demonstrates how and why the organisation of human as well as technical and financial resources contributes directly to organisational success.

**Objectives:**
On completion of the module, students will be able to:
- Demonstrate an understanding of themselves and others in the working environment
- Have developed a realistic awareness of their own strengths and weaknesses and to be able to manage their own self-development
- Demonstrate appropriate levels of skills in working with and managing individuals and teams
- Understand relevant theoretical frameworks and techniques that will assist them in the management of their own self-development

**Pre and Post course reading:**

**Content:**
The module sets out to develop skills of managing oneself and going on through the skills of working with and managing others, including:
- Personal skills, learning skills, time and stress management
- Interpersonal skills
- Human resource management
- Team skills
- Problem solving skills
- Management skills
- Self-development skills

**Method:** The module will include a variety of approaches which will encourage participative learning. Methods include individual and group exercises and role-playing together with films, short presentations, discussions and reading.

**Assessment:** Through a post module assignment

**Course deliverer:** Ms Caroline Clarke, Bristol Business School, University of the West of England
Email: Caroline3.Clarke@uwe.ac.uk

**Venue:** On site training venue or Bristol Business School, University of the West of England

**Duration:** 5 days

## Aerospace Design Process: Concept to Compliance

**10 credits**
**Level 2**

**Management -** University of the West of England
**Design** – Bristol University
**Marine Technology** – Newcastle University

**Who should attend:**
EEPDP students and new recruits for design and product definition areas, or areas that interface with them.

**Objectives:**
On completion of this module a student will typically be able to:

- Show detailed knowledge and understanding of the Aerospace design process
- Demonstrate subject specific skills with respect to sensitivity analysis and optimisation
- Show cognitive skills with respect to prioritisation and identification of relative importance of design requirements
- Demonstrate key transferable skills in communication, self-management, IT in context, problem formulation and decision making, progression to independent learning, awareness of professional literature and working with others.

**Course content**:

- Ability to assess relative importance of aerospace customer requirements and priorities.
- Understanding of certification requirements.
- An understanding of how to create an objective hierarchy showing relative importance of requirements and constraints.
- Generation of abstract aerospace design configurations.
- Creation of general arrangement sketches of alternative design solutions and major systems (powerplant, landing gear, control system etc).
- Analytical assessment of alternative designs.
- The need to exercise engineering judgement in the face of uncertain knowledge.
- Sensitivity analysis and the use of stochastic design variables.
- Use of optimisation tools and statistical analysis to refine and produce a robust design solution.
- Presentation of case studies and critical review of the design process.

**Method**:
Delivered as an intensive teaching block, the mornings will be dedicated to introducing the students to the tools and techniques and the afternoons will be dedicated to "hands-on" teamwork to achieve staged deliverables throughout the week. Students will use a number of software tools for the case study and will need to access data-sources from the WEB.

This module draws heavily on industry experts who will run workshops/lecture sessions throughout the taught part of the module.

**Assessment:**
**Pre-module** - A web-site containing a substantial amount of pre-module study material is been set up for students to access. Students are required to read much of this material, and familiarise themselves with other items within this website. The module is based on a hypothetical aerospace design case study. Students are expected to read this case study and prepare for the module by generating some initial design solutions. These will be presented during the module and assessment marks awarded.

**Post-module** - An individual written assignment, of between 3000 and 5000 words is required, to which the majority of assessments marks will be assigned.

**Module Leader:** Dr Laurent Dala, University of the West of England
Laurent.Dala@uwe.ac.uk

**Venue:** Engineer's House, Clifton, Bristol (to be confirmed)

**Duration:**
5 days

**Business Systems Excellence**
**10 Credits**
**Level 2**

**Core/Management** – University of the West of England
**Management** – Bristol University
**N/A** – Newcastle University

**Aim:**
This module aims to introduce the principles of Total Quality Management in the context of organisational and cultural change dedicated to the continuous improvement of products and services.

**Learning Outcomes:**
On completion of the module, students will:

- Understand the basic themes and principles of TQM
- Be familiar with various styles of TQM approach and methods for the introduction and application of TQM principles
- Be able to deploy methods for achieving improvement of the performance of design, manufacturing and business systems through the use of multi-disciplinary teams.
- Have an in-depth knowledge of practical tools and techniques for quality problem solving.
- Appreciate the need for the culture of continuous improvement and change within an organisation, to achieve the highest levels of product and service quality.

**Target Students:**
The module is intended for experienced engineers, project managers, administrators and managers who need an introduction and deeper understanding of Total Quality Management and it's application.

**Learning Environment:**
There will be a combination of lectures, seminar discussion groups, practical case studies and individual/group project work.

**Pre-Module Study:**
Students will be required to investigate and submit a proposal related to a quality issue at their workplace, carry out a limited investigation and assemble relevant information and data (approximately 10 hours work).

**Post-Module Assignment:**
Completion of the pre-module assignment, producing a project report of approximately 2,500 words.

**Venue:**
Engineers House, Clifton, Bristol.

**Module Leader:**
Paul Head, Faculty of BIT), University of the West of England. Email: paul.head@uwe.ac.uk