**Overview**

The Department of Aeronautics provides a comprehensive and integrated programme addressing the science, technology and application of high performance composite materials. The programme is delivered by leading experts in the field of composites from Imperial College as well as from research organisations, industry, other universities and the Ministry of Defence. The underlying aim of the programme is to provide high quality postgraduates with the skills to take up leading roles in the design, research and development of composites technology for a wide range of industrial sectors including aerospace, transport, marine, offshore, sports goods and civil engineering.

**Accreditation**

The programme is accredited by the Royal Aeronautical Society, the Institute of Materials, Minerals and Mining and the Institution of Mechanical Engineers.

**Programme Structure**

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The programme can be undertaken either on a 1 year full-time basis or by part-time attendance over two years. In the first year part-time students attend the lectures, complete the coursework assignments and sit the examinations for parts A indicated in the above programme structure. In the second year of attendance these students will complete the remainder of the lectures, coursework and examinations (parts B). The part-time students will normally carry out the individual project during the May-Sept period of the second year but it is possible for the project work to be spread over the two years of part-time attendance.

**LECTURE MODULES**

**PART A:**
- Introduction to Composites
- Revision Chemistry
- Interfaces
- Composites Systems
- (Polymer, Ceramic, Metal)
- Stiffness and Strength

**PART B:**
- Electrical Properties
- Joining
- Laminate Analysis
- Fatigue
- Environmental Effects
- Impact

**Revision Modules**
- Stress Analysis
- Fibres
- Manufacturing Science
- Non Destructive Evaluation (NDE)
- Mechanical Testing

**COURSEWORK PROGRAMME**

**PART A:**
- Laboratory classes and associated reports on:
  - Flexure
  - Compression
  - Fracture

**COURSEWORK PROGRAMME**

**PART B:**
- DSC/DMA
- Channel Warping
- Analytical Techniques
- Finite Element Analysis

**Group Design Study:**

Students work in groups of 4/5 on a defined task e.g. design of a portable composite road bridge for disaster relief. The study includes regular progress meetings and a final oral presentation and report.
INDIVIDUAL PROJECT

The project constitutes a piece of individual research which must include some element of originality and can be wholly experimental, wholly theoretical, or a mixture of the two. Students select projects from a list of topics proposed by university staff and by industry. The results from the study must be set in context against published work. The project is assessed by progress in conducting the work (including 4 monthly progress reports), a dissertation of about 10,000 words, and an oral presentation.

It is expected that many projects will have significant industry support and may be wholly or partly undertaken in industry, as appropriate.

Project Key Dates

April/May ⇒ September (before start of new academic year)
Project titles and short descriptions are collected from industry and university staff

Early October
Project titles and description issued to students

Mid-January
Students to submit selection forms. (If a company wishes to interview and select specific students for its projects then this process needs to be completed by mid-December)

Mid-February
Projects allocated to students

Mid-May
Students begin projects

Mid-September
Deadline for project report submission

Examples of External Projects Offered in 2012-13:

- Fracture and Iosipescu shear of multi-angular laminates
- Effect of curing process on interlaminar morphology and subsequent mechanical performances of third generation pre-impregnated (prepreg) carbon-fibre UD tapes
- Fracture and Iosipescu shear of multi-angular laminates
- Shear-after-impact testing of composite laminates
- Effect of curing process on interlaminar morphology and subsequent mechanical performances of third generation pre-impregnated (prepreg) carbon-fibre UD tapes
- Methods of forming in-plane and out-of-plane wrinkles in composite test specimens
- Recyclability of aero grade composites
- The effect of test method on the experimental measurement of through-thickness strength of composite laminates
- Optimisation of structural and electrical response of composite materials
- Hansen’s Solubility Parameters for Epoxy Laminates
- Weathering degradation of blades outer laminates
- Development of a measurement system to determine the tack properties of prepreg materials
- Optimum mix ratios for novel epoxy systems
- Investigation of the factors which affect resin bleed out of preimpregnated materials during cure
- Investigation of the environmental degradation of steel surface treatments
- Investigation into the mechanical properties of glass fibre reinforced polymer (GFRP) composites comprising of novel chemistry matrices
- Design of a resin dispensing system for filament winding process
- Investigation of the bond strength between surface treated steels and GFRP laminates using epoxy adhesive in extreme low temperature environments
- Investigation into the processing characteristics of a polyurethane (PU) resin system compared to an epoxy resin system
- Development of material models and design optimization of prefabricated hybrid joints
- Development of a method for testing the hot-wet tensile and compressive static and fatigue strength of composite laminates containing impact damage

Further Details

For further information about the programme please visit: http://www3.imperial.ac.uk/aeronautics/pg/composites

For enquiries about the programme, please contact:

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