

The logo for Arkwright Scholarships features the word "Arkwright" in a large, dark blue serif font. Below it, the word "SCHOLARSHIPS" is written in a smaller, dark blue, all-caps sans-serif font. To the right of "SCHOLARSHIPS" are five small, dark blue circles arranged horizontally. The entire logo is centered within a decorative border consisting of four L-shaped corner pieces in purple, orange, and teal colors, connected by horizontal and vertical bars of the same colors.

**Arkwright**  
SCHOLARSHIPS ●●●●●

# **Affiliated Schools' Handbook**

**Designed as a reference tool for  
Design and Technology Teachers  
and Candidates applying for  
an Arkwright Scholarship**

**ACADEMIC YEAR  
SEPTEMBER 2009/10**

**Scholarships to be awarded in September 2010**

# MISSION STATEMENT

To encourage and stimulate high ability 15/16 year old students to take up engineering or technological careers by awarding Scholarships during AS/A2 Levels / Scottish Highers which are funded by industry partners and charitable trusts.

## INTRODUCTION

This handbook has been compiled for Heads of Design and Technology and other teachers involved with the Scheme.

The handbook includes the Criteria for School Affiliation, the Scholarship Application Process and details of how Arkwright aims to promote the partnership between the Scholars and Sponsors.

The handbook will be revised annually to recognise the changes in the Curriculum.

Any questions that are not answered may be directed to the Administration Manager at the address below.

The Arkwright Scholarships Trust  
74 Upper Holly Walk  
LEAMINGTON SPA  
Warwickshire  
CV32 4JL

Tel 01926 333210  
Fax 01926 333212





Email [enquiries@arkwright.org.uk](mailto:enquiries@arkwright.org.uk)

[www.arkwright.org.uk](http://www.arkwright.org.uk)

Correct at the time of going to press.

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*Changes and new information are highlighted by the black line in the left margin.*

# 1 SCHOOLS' AFFILIATION CRITERIA

To be considered for affiliation of the Arkwright Scholarship Scheme Schools:

- should have Year 11 students studying Engineering, Design & Technology or *Scottish Standard Grade students studying Technological Studies, Graphic Communication, Craft & Design or DET* (here-on referred to as D&T) or have feeder schools offering the subjects;
- Should be teaching Engineering related subjects or Design & Technology at A2, IB or National Diploma (Highers and Advanced Highers in Scotland) or equivalent;
- Should have a Headteacher who is a strong supporter of Science, Technology, Engineering and Maths (STEM) activities in the curriculum;
- Should present opportunities to participate in STEM activities outside the curriculum;
- May be required to host the Arkwright Aptitude Paper at the School for students from feeder schools

## How To Apply

If your School meets the criteria above you should contact the Administration Manager who will arrange for a Liaison Officer to visit your school to meet and talk to the Headteacher and Head of Design and Technology.

## Policy regarding 11 – 16 Feeder Schools

If a potential Arkwright Scholar is identified and subsequently awarded a Scholarship at an Authorised Arkwright 11 – 16 School, the first year of the Award will be given to the School's D&T Department at that school. The second year of Award money will, subject to a satisfactory first year report, be given to the post 16 School the Scholar attends. This school, if not affiliated, will have to become an affiliated Arkwright School.

## Policy for students on GCSE fast track course



Students who take D&T in Year 10 and other GCSEs in Year 11 should apply for their Arkwright Scholarship in Year 11. . If a student does apply in Year 10 and is not taking all his/her GCSEs this year the Scholarship it will be deferred for a year.

Students who complete all their GCSEs in Year 10 and start their A/S subjects in Year 11, completing A2 in Year 12 should apply for an Arkwright Scholarship when they are in Year 10.

## Transferring a Scholarship from the School of application

In exceptional circumstances, ie when a school is not able to offer the A Level subjects a student has been advised he/she should study for specific university degree, The Trust will transfer the Scholarship to another Affiliated School\*. If the transfer to a Non-Affiliated School is made for the above reason the School will have to apply to become Affiliated. The School of application will automatically receive the first year money. The Chief Executive of The Arkwright Scholarships Trust will advise how the second year funding will be distributed.

\*School must be Affiliated at the time the student submits his/her application.

# 2 SCHOLARSHIP APPLICATION CRITERIA

The Arkwright Scholarships Trust is committed to ensuring that we recognise talented young people in the field of engineering and technology. Therefore it has been decided to broaden the application criteria to encompass Maths. It is recommended that students who show an initial interest in the scholarship should be given an opportunity to study a past paper.

- To be considered for an Arkwright Scholarship, a student must be in Year 11, or S4 in Scotland. They will be in their final year of GCSEs, Scottish Standard Grades or National Diploma in Engineering, Level 2. They will be at an Affiliated School or planning to study in

the sixth form at an Affiliated School (arrangements can be made to affiliate a new school subject to agreement);

- Studying Engineering, Design and Technology in one of its specifications for public examination in that academic year. (**Scotland Technological studies, Graphic Communication, Craft & Design or DET**)
  - Making a commitment to Maths at AS Level and preferably to A2 in the Sixth Form. (**Scotland Higher or Intermediate 2, preferably to Advanced Higher / Higher in S6**)
  - Making a commitment to an Engineering National Diploma, Level 3 Or D&T at AS level and preferably to A2 in the Sixth Form
- or
- be able to demonstrate enthusiasm and aptitude in practical engineering or technology (Scotland Technological Studies, Graphic Communication or Product Design Highers and preferably to Advanced Higher level in the Sixth year).
  - Actively considering higher education in Engineering, Product or Industrial Design or Architecture.

The International Baccalaureate is an acceptable alternative to A/S and Highers and study should preferably be taken to Higher Level.

Up to 15 Scholarships per annum will be available for outstanding candidates who do not intend to take Maths beyond GCSE level.

It should be noted that Scholars who change career aspirations or elect to drop Maths and/or D&T before commencing their Scholarship or after A/S should notify the Chief Executive in writing immediately, giving a full explanation of the reasons and stating their proposed career route. Each case will be reviewed on an individual basis. Possible outcomes of such reviews are:

They will still continue to receive their Award

The Award will be withdrawn but the Arkwright Scholar status may be retained. The Award for the school will be retained.

The Scholarship will be withdrawn from both School and Scholar

### **3 BENEFITS**

The Scholar will receive £500.00 over two years and the School's D&T department will receive £400.00 over two years (second year money is released after a satisfactory first year report is submitted).

Public recognition of the excellence of D&T in the School

Opportunity to work with business and industry

Raises the profile of the subject with younger people

Provides a springboard to interact with other centres of excellence at high profile events.

Exposes capable students to the experience of scholarship assessment

Scholars are matched to a sponsor by regional location and/or career aspirations.

Receive details of opportunities, relating to career aspirations, such as engineering awareness courses, company open days.

Opportunities to network with other Scholars through the Arkwright Alumni website.

Scholars may approach their sponsor for work experience and/or careers advice.

Possible sponsorship from sponsors while studying at university or work in the vacations.

Details of Scholars may be passed to companies looking to recruit Undergraduates and Postgraduates in specific engineering disciplines.

## 4 SCHOLARSHIP APPLICATION

The application process comprises three components: application, aptitude paper and interview.

There is a £35.00 fee for each examination entry and this covers administration and aptitude paper costs. Invoices are forwarded to the Head of Design and Technology at the school with the Aptitude Papers.

There will be a £20.00 administration charge for any Candidate who is withdrawn between receipt of application and the date of the Aptitude Paper. Written notification (email will be accepted) is required of the withdrawal of a Candidate. Any Candidate registered to sit the Aptitude Paper but whose script is not submitted for marking will be charged the full fee of £35.00.

### 4.1 Application

Application forms are included with this handbook, **photocopies may be made.**

Completed applications must be received by the closing date **Friday 22<sup>nd</sup> January 2010. Late applications will not be accepted.**

### Multiple Applications

Where more than one application is submitted it would be appreciated if the Head of Design & Technology would provide a Rank Order of the candidates either on the application form or in a covering letter, preferably the former, with Grade 1 being best. The Rank Order will only be looked at when selecting borderline candidates for interview. The Rank Order will not be disclosed to the candidate.

### Online Application

You are not able to apply online this is to ensure that only students nominated by Affiliated Schools apply.

However the Application Form is available in Word format from <http://www.arkwright.org.uk/schools/> and should be downloaded to your own pc for completion. All sections of the form may be completed in Word by the relevant people and printed and signed personally before posting to Arkwright. The file is password protected and the password is provided in the covering letter with the copy of the year's Handbook and application form. If access to the file is not possible a copy of the file can be obtained by emailing [kdown@arkwright.org.uk](mailto:kdown@arkwright.org.uk) with a request.

### Special Circumstances

Where a school is aware of any special circumstances relating to a candidate, this should not preclude the application. Details should be provided by email to [jbeddows@arkwright.org.uk](mailto:jbeddows@arkwright.org.uk). Agreements will be confirmed by email and a copy should be attached to the Candidate's script when posting to the Marker.

### 4.2 Aptitude Paper

Candidates will sit the Aptitude Paper in their own Arkwright Authorised School on **Wednesday 3<sup>rd</sup> February 2010**. Papers and invigilator's instructions will be posted to the School's Examinations Officer first class on **Friday 29<sup>th</sup> January 2010**.

### Format

*The 2010 Aptitude Paper will comprise **ONE** paper of two hours duration.*

Candidates will be required to answer one question from three.

Candidates must clearly mark their papers in the top right hand corner with their name, school and the number of pages % of Y+.

Candidates original papers together with the Attendance Register should be posted immediately after the exam, by registered or recorded delivery, to the designated Marker. Special arrangements can be made for Candidates who are not able to sit the paper on this day. Contact the Office to make arrangements and a confirmation document will be sent to the Examinations Officer. Papers must be posted no later than **Friday 5<sup>th</sup> February 2010** using the label provided by the Trust with the Aptitude Paper (NB the Marker may vary from year to year).

**Copies of the 2009 Aptitude Paper and previous year's Papers are available at <http://www.arkwright.org.uk/scholars/aptitude.htm>**

### Preparing your candidates for the Aptitude Paper

Candidates should not spend time formatting paper with logos and borders etc. Make your candidate/s aware of the four main areas of Marking

## APTITUDE PAPER FOR SCHOLARSHIPS TO BE AWARDED IN SEPTEMBER 2010

**WEDNESDAY 3<sup>rd</sup> FEBRUARY 2010  
DURATION 2 HOURS**

### INSTRUCTIONS TO CANDIDATES

You are required to answer **ONE** question only.

You are required to answer **ONE** question only.

In your answers you should;



	Mark	Suggested Time In Minutes
a) Develop a list of Specification points. Fully justify each specification point made.	15	20 mins
b) Produce at least <b>three</b> initial ideas which <ul style="list-style-type: none"> <li>• Demonstrate flair and imagination</li> <li>• Are functional</li> <li>• relate to the specification</li> <li>• have their merits fully explained</li> </ul>	5 10 10 10 10 45	60 mins
c) Develop your preferred solution. You should address the following: <ul style="list-style-type: none"> <li>◆ Function: ( including critical dimensions where appropriate)</li> <li>◆ The selection of appropriate materials</li> <li>◆ Details of construction</li> </ul>	15 5 10 30	40 mins
d) Demonstrate an organised, logical and well presented response.	10	
<b>TOTAL MARKS</b>	<b>100</b>	

### ALL YOUR A3 ANSWER SHEETS MUST HAVE IN THE TOP RIGHT HAND CORNER

- ◆ Your name and school clearly printed
- ◆ The number of the question you have chosen to answer.
- ◆ The page number

4.2.1 Detailed Marking Division



<p><b>A – Develop a full specification that offers supporting reasons behind each important point.</b> (15 marks)</p>	
<p><b>Understanding</b></p>	<p><b>Specification</b></p>
<p><b>High Achievement</b></p> <p>Clear understanding of the problem.</p>	<p>Thorough analysis of all factors involved, leading to a complete design specification (14-15)</p> <p>Sound analysis of all the important factors involved, leading to a clear specification (13-11)</p> <p>Satisfactory analysis of most of the important factors involved, including constraints, leading to a reasonably clear specification (10-8)</p> <p>Superficial analysis of some of the factors involved, leading to an imprecise design specification (7-5)</p> <p>Scope for analysis very limited, Minimum specification. (4-2)</p>
<p><b>Medium Achievement</b></p> <p>Problem understood</p>	<p>Little or no analysis of specification (1-0)</p>
<p><b>Low Achievement</b></p> <p>Problem vaguely re-stated</p>	
<p>No re-statement of problem</p>	

<b>B - A range of initial concepts which demonstrate flair related to the specification with reasons for acceptance and rejection.</b>			
<b>(45 marks)</b>			
<b>Concepts</b>	<b>Functionality of Ideas</b>	<b>Meeting Specification</b>	<b>Reasoning</b>
<b>5 marks</b>	<b>10 marks</b>	<b>10 marks</b>	<b>10 marks</b>
<b>High Achievement</b>			
Numerous ideas, each differing in kind, principle or approach (5)	Displays fully functional ideas all differing in kind, principle or approach. (10)	All areas of the specification fully met with enhancements (10)	Fully supported reasoned advantages / disadvantages of all ideas clearly identified (10)
A variety of different concepts identified (4)	Displays a fully functional set of concepts (9)	All areas of the specification fully met (9)	Fully reasoned with advantages / disadvantages of all ideas clearly identified (9)
<b>Medium Achievement</b>			
Three similar ideas identified (3)	Displays a mostly functional set of concepts (8-7)	Specification mainly met (8-7)	Some reasoning stated on most ideas (8-7)
Two different ideas identified (2)	Displays a limited functional set of concepts (6-5)	More than basic points of the specification met (6-5)	Some reasoning stated on some ideas (6-5)
<b>Low Achievement</b>			
One idea identified (1)	Displays a vaguely functional set of concepts (4-3)	Basic points of the specification met (4-3)	Some minor comments made of suitability of idea (4-3)
No viable idea shown (0)	Displays concepts which would work with some modifications (2-0)	One or two points of specification met (2-0)	Vague/no mention of Suitability of idea (2-0)
		Dynamic response (10)	
		Exciting response (9)	
		Displaying sound flair and imagination (8-7)	
		Limited flair and Imagination (6-5)	
		One idea showing some flair and imagination (4-3)	
		Basic idea(s) shown (2-0)	

<b>C - A development of one idea into a proposal for a solution to the question (30 marks)</b>		
<b>Development of Ideas Including function and sizes</b>	<b>Materials</b>	<b>Construction</b>
<b>15 marks</b>	<b>5 marks</b>	<b>10 marks</b>
<b>High Achievement</b>		
Thorough, comprehensive sophisticated / elegant solution displayed (15-10)	All considered materials specified with regard to suitability for purpose (5-4)	Full details of the methods of construction with consideration being given to alternative methods of construction (10-7)
<b>Medium Achievement</b>		
Logical development with basic detail shown (9-5)	Materials identified with minimum qualities described (3-2)	Basic Ideas of construction methods identified (6-3)
<b>Low Achievement</b>		
Minimal development of idea (4-0)	Vague reference to materials that could be used (1-0)	Limited mention of construction (2-0)

<b>D - Ability to communicate clearly, including appropriate graphic techniques. (10 marks)</b>	
	<b>Ability to Communicate</b>
	<b>10 marks</b>
<b>High Achievement</b>	Skilful, thorough and effective communication of proposals, showing a variety of sophisticated graphic techniques. (10-9)
	Logical, clear and skilful communication of proposals, supported by a range of fluent graphic techniques (8-7)
<b>Medium Achievement</b>	Clear communication of proposals, supported by sound, graphic techniques. (6-5)
	Proposals communicated adequately, but lacking clarity in some aspects. Graphic techniques appropriate, but simplistic. (4-3)
<b>Low Achievement</b>	Disorganised work with little attempt to communicate clearly. Inappropriate, graphic techniques. (2)
	Disorganised work with no attempt to communicate clearly. Very poor graphic techniques (1-0)

## Illness

If a candidate is off school due to illness on the day the Aptitude Paper is sat, contact the Arkwright Scholarships Trust's office for advice.

## 4.3 Interviews

Following the Aptitude Paper candidates will be shortlisted for Interview. Interviews will take place on the following dates in 2010

29 <sup>th</sup> March Imperial College, London
30 <sup>th</sup> March Imperial College, London
31 <sup>st</sup> March Loughborough University (tbc)
8 <sup>th</sup> April University of Bath
9 <sup>th</sup> April The University of Sheffield
12 <sup>th</sup> April Cambridge University
15 <sup>th</sup> April Southampton University
19 <sup>th</sup> April Heriot-Watt University
21 <sup>st</sup> April Lancaster University (tbc)



### 4.3.1 About the Interview Venues

This information has been provided by each University to assist you in selecting your interview venue. Details are correct at the time of printing. \*please check the university website for any changes to entry requirements.

<b>Interview Venue</b>	<b>Imperial College London</b>
<b>Interview Date/s</b>	<b>29<sup>th</sup> and 30<sup>th</sup> March 2010</b>
*Preferred Subjects to read	Mathematics Physics Engineering Further Mathematics
*Preferred Entry Grades	A* in mathematics and A in physics at A level plus the equivalent of A grade in a third A level
<p>The Faculty of Engineering is one of three Faculties within Imperial College London and led by Principal, Professor Stephen Richardson. The Faculty is one of the largest engineering faculties in the UK, with around 1,200 staff, over 5,000 students and research income of £60M. In the 2008 Times Higher Education Supplement World University Rankings for Engineering and IT Universities, we were placed 2nd in Europe and 7th in the World.</p>	
<p>The Faculty comprises 9 Departments:</p> <ul style="list-style-type: none"><li>• Aeronautics</li><li>• Bioengineering</li><li>• Chemical Engineering and Chemical Technology</li><li>• Civil and Environmental Engineering</li><li>• Computing</li><li>• Earth Science and Engineering</li><li>• Electrical and Electronic Engineering</li></ul>	

- Materials
- Mechanical Engineering

The Faculty is also responsible for the inter-disciplinary Institute of Biomedical Engineering.

An engineering education at Imperial involves a rigorous grounding in fundamentals using mathematics as a tool to support understanding and develop new concepts. We believe that comfort with the basic principles is what ultimately drives innovation, the lifeblood of engineering.

Our courses are designed in an integrated way and build up engineering expertise in a stepwise fashion. We utilise a balance of theory and practice, with many group-based coursework projects to supplement lecture material. There are also opportunities to undertake project work at an overseas institution when studying one of the year abroad courses.

Our undergraduate courses are accredited by the relevant professional institutions and are therefore part of the formal educational requirements for professional practice as an engineer.

In addition, the Faculty also offers a wide range of advanced postgraduate courses and opportunities for research in its departments and centres.

Imperial's graduates command some of the highest graduate starting salaries and get the most graduate-level jobs. All the engineering departments set very high aims for our undergraduate and postgraduate teaching. Our goal is to shape your professional future as engineers, to be creative and innovative and to excel in your chosen field. Our degrees will also put you on the right career path in sectors such as manufacturing, engineering consultancies, R&D or investment banking. An impressive proportion of graduates also go on to further education.

Website [www.imperial.ac.uk](http://www.imperial.ac.uk)

**Interview Venue**      **Design & Technology, Loughborough University**  
**Interview Date/s**      **31 March 2010**

\*Preferred Subjects      Creative discipline e.g. Design and Technology, Art and Design.  
 Maths/Physics for BSc.

\*Preferred Entry Grades      260 to 300 tariff points with B in a creative subject.  
 Portfolio presented at interview if shortlisted.

**Summary of Degree**

Undergraduate courses are three-or four-year BA Industrial Design and Technology or BSc Product Design and Technology (on both courses there is an opportunity to spend the third year in industry, which can lead to the additional award of a Diploma in Professional Studies). The courses explore and develop designers' abilities in three-dimensional designing and prototyping, integrating the study of many design-related subjects, whilst allowing students to maintain a focused strand of study appropriate to their background, skills and aspirations. All of this is set in a context of creative and innovative practice. The core programme of the courses includes design practice, technology, drawing, manufacturing, CAD/CAM/RP, design contexts, design engineering and design communication. Students are able to select from a range of optional subject modules to supplement their core experience, either doing further work on core topics or developing expertise in different specialised areas. Typical option modules include: New Product Development; Universal Design; Interface Design; Entrepreneurship & Innovation; Sustainable Design; Electronic Systems; Mechanics for Designers; Materials Science; Product Styling and Semantics; and Issues in Design Education (particularly useful for those with a possible interest in teaching).

## **Engineering Activities**

A particular strength of student work at Loughborough is the development of fully functional appearance prototypes, supported by teaching components within both the BA and BSc courses. In the final year of study the production of these prototypes is usually linked with industrial partners, providing a truly real-world industrial experience as the students complete their final major projects. After graduation

## **Other information which may be of interest to a prospective Undergraduate**

Once a student graduates with their design degree, there are further opportunities including year-long postgraduate Masters courses which focus on more specific design activity relating to sustainable design, interface design or new product development. Alternatively, graduates can follow a Postgraduate Certificate in Education (PGCE), which prepares them to teach design in schools and leads to a rewarding career teaching design. Ask your teacher! A Product Design Commercialisation Studio also allows graduates with bright design ideas to develop them further into commercial products, with the full support of business entrepreneurs as mentors to provide commercial advice on matters such as branding, marketing and intellectual property protection. This is a unique opportunity for students to make money, and a name for themselves, out of their project work. Work in the Commercialisation Studio can lead to the establishment of a new company, which can then also be supported by the Loughborough University Innovation Centre. All these programmes provide a challenging education in industrial/product design and technology. They offer the opportunity to develop a wide range of skills and knowledge that will enable students to be involved in the integrated design of products, making key decisions on functionality, appearance and manufacture. The programmes also provide a valuable education that can lead to a wide range of careers in other fields. For more details contact: A Department of Design and Technology, Loughborough University, Loughborough, Leicestershire LE11 3TU, telephone 01509 222651/2, email [dtooffice@lboro.ac.uk](mailto:dtooffice@lboro.ac.uk)

Website | [www.lboro.ac.uk/departments/cd](http://www.lboro.ac.uk/departments/cd)

**Interview Venue**      **The University of Sheffield**  
**Interview Date/s**    **9 April 2010**

\*Preferred                      Mathematics and Science (note . some disciplines specify Physics)  
Subjects to read  
Engineering  
\*Preferred Entry              Varies between AAB and BBB . see website for specific course requirements  
Grades

### **Summary of Engineering Degree/s (method of study/ optional sandwich years etc)**

Various courses are offered by the Engineering Faculty in the departments of:  
Aerospace Engineering, Automatic Control and Systems Engineering, Chemical and Process Engineering, Civil Engineering, Computer Science, Engineering Materials (including Biomedical Engineering), Electronic and Electrical Engineering, Mechanical Engineering. You may decide to study a single engineering subject, or you may want to consider a combined course such as Structural Engineering and Architecture, Chemical Engineering and Chemistry, Mechanical Engineering with Industrial Management or maybe Engineering with a Modern Language.

**Engineering Activities (competitions, links with sponsors, Institution endorsed courses)**

Our courses produce multi-skilled graduates with technical command and management potential, essential for today's engineer and tomorrow's business leader.

We have strong contacts with industry. Many companies are involved in project work, lectures, sponsorship and careers fairs. Our graduates have been employed by companies including Rolls Royce, Arup, Jaguar, BAE Systems, Airbus, Atkins, Boeing and Deutsche Bank.

All our courses are accredited by the relevant professional institutions. The accreditation by these institutions allows our graduates to proceed to a Chartered Engineer qualification after suitable experience in industry.

**Other information which may be of interest to a prospective Undergraduate**

If you study engineering at the University of Sheffield and are a UK student you will be entitled to an annual bursary of £265 for each A grade you achieve at A-Level (for the 3 subjects which make up your offer) . (2009). This bursary is independent of household income.

For details of all bursaries see - <http://www.sheffield.ac.uk/bursaries/>

Website <http://sheffield.ac.uk/>

**Interview Venue** University of Cambridge Department of Engineering  
**Interview Date/s** Monday 12 April 2010

**The University**

Cambridge University consistently tops the league tables for quality of teaching and research. It is a collegiate University, with 31 Colleges. The personal teaching and support provided by the Colleges is the most distinctive feature of the Cambridge system. It complements and supplements the lectures and practical work organised by the Department.

**The Department**

The Department of Engineering is located close to the city centre and within easy reach of the majority of the Colleges. Around 10% of all Cambridge students, that is around 1200 undergraduates and 600 postgraduates, study Engineering. The Department has achieved the highest rating in all the national Research Assessment Exercises, and in the Teaching Quality Assessment, undertaken by the Quality Assurance Agency for Higher Education, its teaching was judged to be excellent.

**Courses**

The Engineering courses at Cambridge normally last four years and lead to the degrees BA(Hons) and MEng (Cambridge has no BSc or BEng degrees; all undergraduates in whatever subject take the BA). The four-year courses are all fully professionally accredited.

For the first two years, all students follow the same course (except for students wishing to specialise in Chemical Engineering who transfer to that Department after the first year). This covers the fundamentals of analysis and design in all the main branches of Engineering with the dual aims of developing the full range of knowledge and skills required for multidisciplinary work and of facilitating a fully informed choice of specialisation. From the third year, the course divides into two: On the **Engineering** course students specialise in one of the following Engineering disciplines:

- Aerospace and Aerothermal Engineering
- Civil, Structural and Environmental Engineering
- Electrical and Electronic Engineering
- Electrical and Information Sciences
- Energy and the Environment
- Engineering for the Life Sciences
- Information and Computer Engineering
- Instrumentation and Control
- Mechanical Engineering

The **Manufacturing Engineering** course provides an integrated course in Industrial Engineering, including both operations and management.

### Entry Requirements

Our normal offer to those taking A-levels is A\*AA. Maths and Physics A-levels are essential and a 3rd A-level in a subject relevant to Engineering is desirable. We are happy to consider applicants with other qualifications, e.g. the IB, Advanced Highers or the Advanced Diploma in Engineering. Vocational qualifications, e.g. a BTEC National in an Engineering discipline, are also acceptable if supported by Maths A-level.

### Open Days and Further Information

Thursday and Friday 1st and 2nd July 2010

Virtual Open Day available on: <http://www.eng.cam.ac.uk/openday/>

Email: [ugrad-admissions@eng.cam.ac.uk](mailto:ugrad-admissions@eng.cam.ac.uk)

Website <http://www.eng.cam.ac.uk/admissions/>

**Interview Venue** University of Southampton  
**Interview Date/s** 15<sup>th</sup> April 2010

\*Preferred Subjects to read Physics  
 Subjects to read Maths  
 Engineering Further Maths  
 \*Preferred Entry Grades AAA for Aeronautics and Mechanical Engineering,  
 AAB for Ship

#### *Summary of Engineering Degree/s*

The School of Engineering Sciences offers an exciting portfolio of MEng (4yr) and BEng (3yr) courses under the three broad disciplines of Aeronautics & Astronautics (which includes Space Engineering), Mechanical Engineering and Ship Science.

Aeronautics and Astronautics is one of the most challenging and exciting careers on offer. It encompasses the design of airliners, fighter aircraft, helicopters, space launch vehicles, satellites and deep space probes. Aeronautics and Astronautics courses at Southampton are highly regarded by industry due to their unique blend of analytical, computational and experimental work, carried out individually and in teams.

Mechanical Engineering is a challenging and exciting subject that covers a wide range of technical activities including the design of machines, conversion of energy, manufacturing processes, medical engineering and microsystems technology. Many sponsors and employers favour Mechanical Engineering over other disciplines because of the broad technical education it provides. In addition, undergraduates can choose to specialise in a range of areas or continue on a traditional programme.

Ship Science is the study of marine vehicles, be they displacement, planning, sailing, hydrofoil, hovercraft, submarines, submersibles or offshore structures. New vessel types are continuously being evolved, whether in the form of new container ships, high-speed catamaran ferries, remotely

operated submersibles or ocean racing yachts. The Ship Science course concentrates on the engineering and science associated with marine vehicles, structures and their design, and provides an understanding of physical processes through studies of fundamental principles, methods, analysis and synthesis and applications.

### **Industrial Links**

The School of Engineering Sciences has strong links with the UK aerospace industry and government research laboratories, in particular Airbus, BAE Systems, Defence Science and Technology Laboratory (DSTL), Qinetiq, Rolls-Royce, as well as overseas organisations such as the European Space Agency. In addition, close links with the motorsport industry provide plentiful opportunity for students to pursue a career path in this related high-technology field.

The School also fosters close collaboration with a number of industry partners, examples of which include the Advanced Technology Partnership with the Royal National Lifeboat Institution (RNLI ATP), the Lloyd's Register of Shipping University Technology Centre (LR UTC), Rolls-Royce UTC and Airbus UTC.

### **Outreach at School of Engineering Sciences:**

The School of Engineering Sciences has a developed outreach programme offering young people the chance to engage with engineering principles and practical projects. A small sample of our outreach programme is listed below:

- Headstart courses (Design Triathlon, Marine & Sustainable Energy) ([www.headstartcourses.org.uk](http://www.headstartcourses.org.uk))
- Smallpeice courses (Supercomputing, Bio-Engineering, Marine) ([www.smallpeicetrust.org.uk](http://www.smallpeicetrust.org.uk))
- University of Southampton Sustainable Energy Scheme . a new initiative working with University of Southampton UK recruitment and outreach team. This scheme involves teams from local schools working with an undergraduate student on a sustainable energy themed project over the course of an academic year. Teams compete to take part in the Greenpower challenge. ([www.soton.ac.uk/schoolsandcolleges](http://www.soton.ac.uk/schoolsandcolleges))
- Greenpower . Electric car races with local Yr10 students ([www.greenpower.co.uk](http://www.greenpower.co.uk))
- National Science & Engineering Week activities . The University of Southampton's Science and Engineering Day event won the inaugural ETB award for the UK's Best Engineering Event to take place during National Science and Engineering Week (NSEW) 2009. ([www.soton.ac.uk/schoolsandcolleges/activities/scienceweek](http://www.soton.ac.uk/schoolsandcolleges/activities/scienceweek))
- Bloodhound SSC - The 1,000mph Super Sonic Car! The primary objective of the Project is to inspire the next generation to pursue careers in science, engineering, technology and maths - by demonstrating how they can be harnessed to achieve the impossible, such as a car capable of breaking the World Land Speed Record. ([www.bloodhoundssc.com](http://www.bloodhoundssc.com))

### **Other information which may be of interest to a prospective Undergraduate**

The School of Engineering Sciences is part of the Faculty of Engineering, Science and Mathematics, and contributes fully to the Faculty's worldwide reputation for high quality teaching and outstanding research.

### **Very best 5\* research**

Staff involved in undergraduate teaching are all members of one of the eight research groups within the School, providing an opportunity to work with and learn from research teams at the forefront of knowledge in their fields.

### **Exceptional teaching quality**

The School received top rankings (24 and excellent) for the quality of teaching and education in the latest assessment exercise and has recently been awarded an ExxonMobil Award in recognition of Excellence in Engineering Teaching, as well as the Royal Academy of Engineering Education Innovation Prize sponsored by BNFL plc.

### **Strong links with Industry**

Our strong industrial links benefit our undergraduate teaching programmes by providing visiting lecturers and case studies from engineering practice; site visits; industrially-relevant third and fourth year projects; opportunities for vacation placements; and excellent employment prospects on graduation.

### **Excellent reputation**

The excellent reputation of engineering at Southampton was instrumental in the Royal Navy's decision to place all its aeronautical, mechanical and ship science engineering undergraduates here. Based on this success, the scheme has been extended to all branches of Her Majesty's Armed Forces, and Southampton was the first of four Defence Technical Undergraduate Scheme Centres to be established in the UK.

### **Accredited courses - achieve Chartered status**

Our four year MEng courses provide a direct route to chartered status whilst our 3-year BEng course meets the core technical requirements for accreditation by the appropriate accreditation body and allows graduates to achieve chartered status subject to the completion of approved additional learning.

### **Extensive facilities**

The equipment and laboratories needed to maintain the School's high research reputation are available for you to use in your first-degree studies.

Website [www.soton.ac.uk/ses](http://www.soton.ac.uk/ses)

<b>Interview Venue</b>	<b>Heriot-Watt University, Edinburgh, Scotland</b>
<b>Interview Date</b>	<b>19<sup>th</sup> April</b>
*Preferred Subjects to read Engineering	Mathematics (for all Engineering degrees) Physics or Tech Studies (all but Chemical Engineering) Chemistry (for Chemical Engineering)
*Preferred Entry Grades	Average for BEng SQA Higher BBBB A-level CCD (1 <sup>st</sup> yr) Average for MEng SQA Higher AB BB A-level BCC (1 <sup>st</sup> yr)

### **Summary of Engineering Degree/s**

Scottish degrees 4yrs duration (full time BEng Hons; MEng 1 extra year). A-level students can enter 2<sup>nd</sup> yr direct with correct grades (higher than quoted above).

Amongst largest provider of Accredited Engineering courses in Scotland.

Areas offered include Civil and Structural, Architectural, Mechanical, Robotics, Engineering Physics, Electrical, Electronic, Computer Engineering. Many sub-disciplines also offered for specialisation in advanced years of the degrees.

### **Engineering Activities**

Links to local schools for taster sessions in Science, Engineering and technology areas.

Links to national programmes such as:

Go4SET

Dragonfly

Headstart

Engineering Education Scheme

Links with numerous Engineering Companies for graduate employment, potential sponsorship, student prizes, work experience, summer placements/secondments etc etc.

### **Other information which may be of interest to a prospective Undergraduate**

University created as a place of Higher Education in 1821, by Engineers and Scientists and Natural Philosophers. Still a place exclusively of vocational learning. Engineering courses accredited by professional bodies to allow graduates to progress towards eventual CEng (chartered) status, where appropriate. Full details of all courses and entry requirements to be found on the University website (see below)

Website: [www.hw.ac.uk](http://www.hw.ac.uk)

**Interview Venue** Lancaster University

**Interview Date/s** 21<sup>st</sup> April

\*Preferred Subjects to read Mathematics and Physics (or related science)

Engineering

\*Preferred Entry Grades BBC for BEng, ABB for MEng

### **Summary of Engineering Degree/s (method of study/ optional sandwich years etc)**

Lancaster University is a campus university dedicated to excellence in teaching and research, for which it is consistently rated among the top UK universities. Its distinctive and flexible degree courses in Engineering received an Excellent grade in the most recent HEFCE Teaching Quality Assessment. Through the project element of our courses, students gain a well-rounded engineering capability which often enables them to progress rapidly in their first jobs to responsible and well-rewarded positions.

A common first year leads to a choice among a range of accredited three-year BEng and four-year MEng courses:

Nuclear Engineering; Electronic Systems Engineering; Mechanical Engineering; Mechatronic Engineering; Computer Systems Engineering; General Engineering.

All are available with a year spent in industry, or with one year of study at a university in the USA, Canada or Australia.

### **Engineering Activities (competitions, links with sponsors, Institution endorsed courses)**

All courses are accredited by either the Institution of Mechanical Engineering or the Institution of Engineering Technology.

### **Other information which may be of interest to a prospective Undergraduate**

A number of University and Industrial Scholarships are available, please see web site for further details.

Website [www.engineering.lancs.ac.uk/](http://www.engineering.lancs.ac.uk/)

Candidates are asked at application stage to indicate a first, second and third choice of date/venue should they be called for interview. If a candidate leaves this section blank it will be assumed that he/she is not able to attend on any of the listed dates.

#### **Aim**

The interview is included as part of the ongoing personal development of the candidates. During the half day they will participate in a teambuilding activity and/or visit the engineering / technology faculties at the University venue. *The aim here is to provide an educational experience incorporating team work and communication skills.*

#### **4.3.2 Guidance for Interviewees**

Revised

The Arkwright Aptitude Paper and Interview is likely to be your first experience of a formal application process and an early experience of personal development. We would like it to be an experience you will remember and find beneficial, by gaining interviewing skills and confidence. During your interview you will have the opportunity to demonstrate your knowledge, flair for design and your commitment to an engineering / technological career.

During the half day you will participate in a teambuilding activity and visit some of the faculties at the university, this may include engineering, technology or design. The aim is to provide an educational experience incorporating team work and communication skills.

#### **Evidence for your Interview**

It is vital that you bring to the interview evidence that demonstrates your talent and potential. This evidence is likely to be work completed in school, but work undertaken outside school is equally welcome. It is suggested that where Technological Studies Standard Grade is studied, evidence of work produced outside the normal course should be provided. This evidence should be your GCSE / Standard Grade portfolio and / or some of your practical work. If for any reason your portfolio is unavailable or your project is too large or fragile to transport please bring along other forms of evidence. This could be photographs and / or sample copies of your portfolio or any other supporting materials.

#### **The Interview**

You will be interviewed by a panel comprising a D&T specialist and at least one other person (an Arkwright representative, teacher or a representative from industry, university or similar organisation). One person will discuss your GCSE / Standard Grade work or other evidence you bring along whilst the other will discuss your career aspirations.

You should:

- arrive in good time..
- make a good first impression (it is suggested that you wear school uniform or something of neat appearance, **NO JEANS or TRAINERS**). As the team building activity is of a practical nature and may require some low level work, female students are advised to wear trousers.
- bring your GCSE / Standard Grade portfolio and / or evidence of work as detailed above.
- if feasible bring your prototype or finished project or photographic evidence.
- display a positive commitment to a future in engineering and show a knowledge of technology and / or relevant interests.
- where possible, have an idea of your career aspirations / university courses.
- become fully involved with the team building activity.

Please remember that we want this to be an enjoyable and beneficial experience for you!

### **Suggested sources for information on engineering careers**

[www.semta.org.uk](http://www.semta.org.uk)

[www.scenta.co.uk](http://www.scenta.co.uk)

web sites of the appropriate engineering institutions for your career aspiration/s.

## **5 SPONSORS**

All Scholarships are supported by either a company, charitable trust, university or other organisation, which has an interest in promoting engineering related careers and/or supporting education.

Scholars who are funded by Charitable Trusts will have an opportunity to attend various Career Awareness Days which are hosted by sponsors. Full details will be forwarded to Scholars as visits are organised.

Details of Scholarsq sponsors will be forwarded to the Headteacher with their invitation to the Award Day and a copy will also be sent to the Head of Design and Technology.

### **Scholars' contact with their sponsor**

Over the two years of the Scholarship Scholars are requested to maintain contact with their sponsor follows:

- September 2010 an introduction letter, to include your GCSE results and thanking them for the support
- September 2011 an update of your progress over the first year and details of A/S results and plans for post 6<sup>th</sup> form study.
- August 2012 a closing letter as A Level results are received, advising of grades and plans for the future.
- Throughout the two years reply to any correspondence from the sponsor and if awards/competitions are won let the sponsor know.

Scholars should bear in mind that their level of contact with their sponsor may have a great influence when Arkwright approaches them to support Scholars in the future. Scholars should also realize that they may in the future apply for sponsorship for university or apply for a year out / work and their level of contact as a Scholar may affect your application.

The %Presentation of Awards+ will be held on Friday 30<sup>th</sup> October at The Institution Engineering and Technology, Savoy Place, London. A formal invitation will be forwarded later in the year. An invitation will also be sent to your Headteacher for one person from the school to attend the Award Day.

## **6 AWARD DAY**

The Award Day is held at a prestigious venue in the autumn.

Scholars are formally invited and asked to nominate two guests to accompany them.

An invitation is forwarded to the Head Teacher at the Scholarq school; if he/she is unable to attend there is an opportunity to nominate a representative.

An exhibition of Scholarsq GCSE work is incorporated into the day. Schools are asked to nominate Scholarsq work and Arkwright will also formally invite some Scholars to exhibit. Full details and nomination forms are forwarded to the Head of Design and Technology.

## 7 MONITORING

Backing up the stringent selection process is the continued monitoring of Scholars. During their AS/A2 or Higher study Scholars will be visited at least once by the regional Liaison Officer. The Liaison Officer can also provide support and advice. Liaison Officers arrange visits with the Headteacher and/or Head of D&T.

The First Year Reports will be posted to Scholars in June together with information from Universities supporting our Selection Process. The front page is completed by the Scholar when lower sixth examinations results are received. The Scholar is asked to pass the report to the Head of D&T for completion. Completed forms should be returned to the Arkwright Office by the end of October.

The release of monies for the second year of the Award is subject to a satisfactory First Year Report. Cheques will be posted to Scholars and Schools at the end of November.

**For Scholars not proceeding to A2 Design and Technology see Section 2.**

Final year reports will be forwarded to Scholars in August to coincide with the notification of A2 and Higher results. Heads of D&T are asked to notify Arkwright of how year two money for the department is spent. An email or fax is sufficient.

## 8 EXPENDITURE OF MONIES

The Scholar and School submit to Arkwright a brief outline of the expenditure of monies awarded, with the First Year Report and the Final Report.

Scholars should use their money for materials and activities relating to their studies. The funding may also be used to support a specific course relating to their career development eg Headstart or The Smallpeice Trust's courses.

Money cannot be used for recreational activities or be saved to support activities post A2 or Highers.

## 9 PROMOTING ARKWRIGHT SCHOOLS AND SCHOLARS

As an Affiliated School it is hoped that the Headteacher and Head of Design and Technology will promote the Arkwright Scholarships in the School's Prospectus. Text and logo can be obtained from the Administration Manager. A copy of the School's A5 leaflet is also available in PDF format for inclusion on school websites.

There are two types of certificate presented by Arkwright recognising affiliated schools' achievements. It is hoped that these will be displayed in a prominent position.

**School Affiliation Certificate** is issued as the school joins the scheme.

**Design and Technology Department Certificate** which will be forwarded with the first year cheque.

A standard press release including statistics is forwarded to schools with notification of scholars.

## 10 List of Affiliated Schools

A list of affiliated schools is available on request or from [www.arkwright.org.uk](http://www.arkwright.org.uk). There are currently 607 Schools in the Scheme.

## 11 EXEMPLAR MATERIAL

Exemplar Material for the past Aptitude Papers are available on the Arkwright web site at <http://www.arkwright.org.uk/scholars/aptitude.htm>

## 12 Examiners' Report for the 2009 Arkwright Aptitude Paper

All three questions proved to be popular this year.

**The Examiners are looking for quality not quantity. Candidates should be discouraged from producing too many pages, a maximum of 4 A3 sheets is expected.**

### Specifications

This section continues to be well answered by a majority of candidates. Good candidates covered materials and ergonomics as well as function and produced well justified specifications. This area is worth 15 marks and a weak specification ie, **one lacking qualifying reasons**, can disadvantage candidates throughout the whole paper as well as in this section.

### Design Ideas

Only a few candidates produced a wide range of possible solutions, most giving three different ideas.

They developed and described ideas and their thought processes were evident from supporting annotation. A greater variety of concepts is encouraged generally in order to maximise marks in this section.

Many candidates failed to produce evaluative comments to their ideas. Comments should refer to specification points.

**It is at this stage that flair in a wide range of solutions is being looked for by the examiners rather than fully developed design solutions.**

### Final Solution

This should stand out from the initial ideas and deal with the key issues outlined in the mark scheme. There were a few excellent responses where candidates brought ideas together to produce a well thought out final solution. A few candidates failed to include possible dimensions. The weaker responses failed to include important details e.g. selection of appropriate materials and construction methodology and tended to only reproduce a sketch from the ideas. Candidates should not re-draw views previously offered, but present new and extended details in this section. The strongest scripts showed evidence of cross referencing the developed idea with the identified needs of the product as set out in the specification.

### Communication

It is possible to gain full marks for communication by producing a range of 2D and 3D drawings. Annotation is essential and should link back to the specification and should not be only descriptive. There is no requirement to use colour but its use can enhance the overall quality of the answer, although this should not be at the expense of detailed development.

### Q1 . Rubbish Bin Compactor

There were some very imaginative solutions but others lacked ingenuity and would have been impractical for many householders, particularly the elderly or infirm. Some candidates

misinterpreted the question and redesigned the bin creating compartments for separating recycled materials.

**Q2 . Table Tennis Server**

This question produced a wide range of innovative solutions for the projection system of the table tennis ball. A few candidates however, failed to show any delivery system and focussed on the outer casing and stand.

**Q3 . Skip Loading Device**

The most popular question attempted which did produce a range of solutions, although many candidates simply redesigned a ramp of greater sophistication.

**13 Your Record of Applicants**

Use this section to record the name/s of your candidate/s and their progress though the Arkwright Selection Process.

Name of Applicant	Interview venue selected on application	Selected for Interview & venue	Awarded a Scholarship	Name of Sponsor

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