

ENGINEERING TRIPOS Part IIA

Extension Activity: Engineering resources for schools

Open to students in all Engineering Areas

INTRODUCTION

Science and Maths in school, from primary to the end of secondary, provide the principal pathway to Engineering careers. But most specifications and teaching make only patchy or no reference to Engineering, while one third of students taking Maths and Physics A level go on to Engineering degrees. There is a shortage of engineers in most countries, including the UK. And the proportion of women continuing after age 16 with Maths and Physics, and thus Engineering, remains far too low. A previous CUED student summarised the problem neatly: “I am here in spite of my school science, not because of it”.

A series of Part IIB projects in recent years has explored a potential contribution to addressing these challenges: development of teaching resources which *set the existing science and maths curricula in Engineering contexts*, often drawing on our Tripos for applications.

This ExA provides an opportunity to propose and draft new resources of this type, drawing on your own area of interest. The only stipulation is that they must be tied to identifiable sections of the UK National Curriculum (for primary Key Stage 1-2, or secondary Key Stage 3) or the specifications for GCSE or A level. Regrettably, from experience we know that teachers and their students rarely have time to stray beyond these. The goal therefore is to help them cover their curricula, consolidating their core skills with exercises, but setting everything in a real world context. Evidence from schools indicates that resources with sustainability and healthcare contexts are successful in addressing the balance of male and female students.

The Moodle page for this ExA provides background material as a starting point:

- examples of previous resources (written in Powerpoint, with an established ‘house style’);
- spreadsheets from previous IIB projects, mapping out possible application areas to school curricula;
- government and exam board documentation on the national curriculum and exam specifications.

Over several years of testing draft resources with teachers and their students, we have established a number of resource types that work well at GCSE and A level:

- Topic Introduction – “*why are we doing this?*”
- Exam-style question (but design-oriented) – “*think like an engineer*”
- Posters on common practicals – “*why are we doing this?*”
- Quick Guide – “*quick revision of a topic*”
- Topic Extension (for enthusiasts / prospective engineers) – “*where is this heading?*”
- Brain teasers – “*quirky, everyday applications, to stimulate awareness*”

So far, we have engaged rather less with primary and Key Stage 3 (Years 7 and 8), but there are some sample resources to stimulate ideas.

Students taking this ExA will select a topic area and target age group, and develop a resource – probably following one of the existing templates above, but feel free to propose something new. Testing and feedback are essential. In normal circumstances, we have worked with teachers and students (provided the resources are of sufficient professional quality); in current circumstances, students will critique one another’s resources.

About 20 hours should be spent on this ExA, which can be undertaken in Michaelmas or Lent, with deadlines for submission of draft resources near the end of term. It may be done over the Christmas vacation, in which case this will be counted as Lent.

ARRANGEMENTS

- (1) **Email Dr Shercliff** (hrs@eng.cam.ac.uk) by 5pm on Monday October 12th, stating name and college, and expressing interest in taking this ExA. If you already have an idea for a topic of interest and target age group, then outline these briefly. State your preference for term: Michaelmas/Lent/either.
- (2) Attend a **briefing on Teams** during the week of October 12th (times TBC), where Dr Shercliff will show previous resources, expanding on the thinking behind them, and answer any queries.
- (3) **Email Dr Shercliff** (hrs@eng.cam.ac.uk) by 5pm on Friday October 16th, confirming intention to take this ExA. **It may be necessary to ballot**, as capacity in each term will be limited.
- (4) **Agree topic and resource type** with Dr Shercliff, who will provide ad-hoc supervisions and guidance on Teams. Students will be paired to review one another’s draft resources.
- (5) **Submit resources in Powerpoint** (on Moodle) by the deadline near end of term. The resources will be presented and discussed in groups on Teams.