Part IIA project guide

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Introduction

During the Easter term following the IIA examinations, all Part IIA students undertake 2 projects from a choice of around 30. A few projects have preparatory sessions during the Lent Term (counting towards the same total workload).

Some projects have pre-requisite modules ('useful' or 'essential') and will assume certain background knowledge. NB. **It is the *students' responsibility* to check these pre-requisites**, and to choose projects (and modules) appropriately - this will NOT be checked via COMET.

Details of schedules and pre-requisites are provided in the Project descriptions.

Projects are of two types, "Group" and "Standard", and you must take at least one Group project. Group-based projects involve working in groups of at least 3, with some degree of inter-dependence, shared effort, and marks for group work. Some Standard projects also involve working in pairs and pooling results.

Most projects are also classified as Design, Field or Language, and you must take at least one Design project. Projects are in timetabled sets, and there are other constraints on allowable combinations (details below).

Project codes (e.g. GA1, SB1) indicate Group (G) or Standard (S), and the associated subject area (A-G, as for IIA modules, plus L for Languages, and M for Multidisciplinary). Projects may be chosen *from ANY subject area* (taking due account of any pre-requisites).

Each project has a leader, but groups of projects also have a coordinator that you are welcome to contact to discuss any general matters throughout your project. You can also contact the Teaching Office, or the overall project coordinator, Prof Graham Treece.

Project codes	Coordinator
GA, GC, SA, SC	Dr Alex White
GB, GF, SB, SF	Prof Ioannis Lestas
GD	Prof Ruchi Choudhary
GG, GM, SG, SL	Prof Graham Treece

Project descriptions

Some of the following projects also provide single page graphical overviews.

Project code	Project	Leader	Category	Type
GA1	Advanced Cycle Power Generation	Prof R J Miller	Design	Group
GA2	Turbo-expander	Prof P G Tucker	Design	Group
GA3	Heat Exchanger	Dr C J Clark	Design	Group
GA4	Heat Pump	Dr A J White	Design	Group
GB1	Optical Fibre Link	Prof T Wilkinson	Design	Group
GB2	Electrical Power	Dr S Goetz	Design	Group
GB3	RISC-V Processor	Dr M Tang	Design	Group
GC3	Mechanics of Natural Materials	Prof S Huang	Design	Group
GC5	Climate Repair	Prof H Hunt	Design	Group
GD1	Sustainable Offsite Construction	Dr B Sheil	Design	Group
GD2	Structural Modelling	Dr R Foster	Design	Group
GF1	Control Systems	Prof F Forni	Design	Group
GF2	Software	Prof A Gee / Dr C Steinruecken	Design	Group
GF3	Audio Modem	Dr. J Sayir	Design	Group
GF4	Structure from Motion	Dr. A Tewari	Design	Group
GF5	Animating 3D Characters	Dr. E Wu	Design	Group
GG1	Microfluidics	Dr T Savin	Design	Group
GG2	CT reconstruction and visualisation	Prof G Treece	Design	Group
GG3	Neural Data Analysis	Prof G Hennequin	Design	Group
GG4	Neural Control with Adaptive State Estimation	Dr F Mancini	Design	Group
GM1	Multidisciplinary Design	Dr P Long	Design	Group
GM2	Technology for the poorest billion	Dr T Bashford	Design	Group
SA1	Aircraft Wing Analysis	Prof R Garcia-Mayoral	Design	Standard
SB4	Modeling of Integrated Photonic Components	Dr Q Cheng	Design	Standard
SC1	Automotive Suspension	Dr R. Roebuck	Design	Standard
SC2	Bicycle Design	Prof M Sutcliffe	Design	Standard
SF2	Image Processing	Dr A Grafton	Design	Standard
SF3	Machine Learning	Dr C Micou		Standard
SF4	Data Logger	Prof I C Lestas	Design	Standard
SF5	Networks, friendship, and disease	Dr G Cantwell	Design	Standard
SG2	Bioreactor Control	Dr S Bakshi	Design	Standard
SL1	Intermediate French	Mr Clément Courouve	Language	Standard
SL2	Advanced French	Mr Clément Courouve	Language	Standard
SL3	Intermediate German	Mr Jan-Moritz Bogdanovic	Language	Standard
SL4	Advanced German	Mr Jan-Moritz Bogdanovic	Language	Standard
SL5	Spanish	Mr S Bianchi	Language	Standard

Note: for information on the timing of projects in each set, see the sections below on Timetable and other constraints and Project timetables.

Key dates

Projects run over a 4-week period after the Part IIA examinations, so that undergraduates have no other scheduled activities. Important dates and deadlines are:

Language projects information session	Thursday 27 November 12:45, CLIC 2	(end of Michaelmas)
Project descriptions available for browsing	Monday 1 December	(Michaelmas, week 8)
Start of input of preferences (all students)	Monday 19 January	(Week before Lent)
Deadline for input of preferences (all students)	by end of Thursday 29 January	(Lent, week 2)
Project allocations (first list) published	Thursday 5 February	(Lent, week 3)
Project allocations (final list) published	Thursday 12 February	(Lent, week 4)

Preparatory sessions for Lent-start projects	See Project descriptions	(Lent, weeks 5-8)
Easter Term project period begins (Language projects: Wednesday 13 May)	Thursday 14 May	(Easter, week 3)
Each project will have interim reports or presentations. Deadlines for these vary - see the Project descriptions for details		(Easter, weeks 3-6)
Hand-in date for final report: Multidisciplinary Design project	Friday 5 June	(Easter, week 6)
Latest hand-in dates for final reports: all other projects	Thursday 11 June / Friday 12 June	(Easter, week 7)

Final project reports must be handed in by **4pm** on the relevant days. Students should aim to submit ahead of the deadline.

NB: final reports will not be accepted after the deadlines, unless there has been agreement in advance for a short extension, due to illness or other grave cause. Project leaders are required to complete all marking by Wednesday week 7 Easter term. In the unlikely event that your project requires hard copy submissions, in that case all interim reports must be resubmitted, appended to your final report.

How to choose a project

Before making your selection, you should read the rest of this guide, noting the project sets, the combinations of sets that are not permitted, and reading project descriptions of interest (including any pre-requisite modules).

Projects may be chosen from *any* subject area, regardless of your Engineering Area(s), with the exception that students specialising in **Civil Engineering** must take either both GD1 and GD2 or one of these projects together with any language project. In either case, one of GD1 or GD2 must be **your first choice**. These are the only options due to the special timetabling constraints of these two projects (see project descriptions above).

Students interested in taking a Language project should attend an information session in the Centre for Languages and Inter-Communication (see Key dates) or have spoken to someone from CLIC.

Students must have finished entering their preferences near the start of the Lent Term (see Key dates above), immediately after COMET closes. These should be entered, in order, for exactly five projects (except for civil engineering students who only need to choose two or three), satisfying the following rules:

1. Some projects have pre-requisites (e.g. useful or essential IIA modules): *it is your responsibility to check the project descriptions, and only to select projects for which you will have taken the pre-requisites*. Your module choices are NOT checked automatically on COMET by the project allocation programme.
2. Your 1st and 2nd preferences must include at least one Group project, and one Design project (many are both). Your preferences overall must include at least 3 Group and at least 3 Design projects.
3. Projects are in sets (P1, P2 etc) with each set having a fixed timetable; projects should be chosen from different sets as far as possible (in most cases, two of your five choices will need to come from the same set, but your first and second choices must be from different sets). Certain other combinations of sets and projects are also excluded (for timetable and other reasons).
4. You are only allowed to select a maximum of two projects from the list of those which are very over-subscribed (currently GA2, GB3, GF2, GG3, GM2 and SF3).

How projects are allocated

Each project has a maximum capacity, due to limits on staff, space and equipment, and some projects may not run if very few students opt for them.

In the online selection page, the sets are clearly highlighted to guide you. Before you can submit your preferences, the software wil make various checks to ensure that you have sufficient valid combinations of projects. You will be prompted to reconsider if any of these checks fail.

Allocation of students to projects is a very complicated procedure. Optimisation is performed over all students and

all projects, to try to ensure that all students get the best possible allocation given the various constraints. It is hence very important that you choose the order of your five projects carefully. Most students are normally allocated at least one of their first two preference projects, but this can not be guaranteed and the 4th or 5th choice project may well be needed – so you should consider all five of your choices seriously, as you may be assigned to any of them.

After the initial allocations are posted, any suspected mistakes or problems with these allocations should be immediately referred to the Teaching Office. The list will be confirmed shortly after the initial posting - see the key dates.

Timetable and other constraints

Projects are in sets (P1, P2 etc) with each set having a fixed timetable (see Table below); projects must be taken from different sets. Certain combinations of sets and projects are excluded for timetable and other reasons.

Over-subscribed projects

Some projects (currently GA2, GB3, GF2, GG3, GM2 and SF3) are usually heavily over-subscribed. You are only allowed to select two from this group of projects in your list of five preferences, though these can be at any ranking. You should be aware that, whilst every attempt will be made to allocate the projects you select, you are less likely to be allocated to such a project. In consequence, your allocations may in this case be lower down your list.

Note that GF2 is available in two sets (P2 and P3) and will run with two separate cohorts, GF2A and GF2B. Students select GF2, and the allocation process will determine which set applies to each student on GF2, depending on their other project.

CIvil Engineering Projects (GD1/GD2)

All students doing civil engineering must complete at least one of these projects, and hence your first choice must be either GD1 or GD2. Your second and third choices can either be the other project, or any language project.

Multidisciplinary projects (GM1/GM2)

You can only take one of these projects: they can not be taken together.

Language projects (sets P8/9)

You can only take one language project, but it can be combined with any other project.

The timetabled sessions consist of 2 or 4 fixed hours (on Wednesdays) with the project leader, plus a choice of supported self-study (SS) sessions, which enable you to avoid clashes with your other project. Students should normally expect to attend during 4-6 hours of the self-study sessions (depending on the number of fixed hours on Wednesday). The project leader and/or a demonstrator will arrange supervisions during the SS sessions.

The Table below shows the options for SS sessions for each project – not all of these will run: the schedule for each project will be determined to fit with the 2nd projects chosen by students.

NB. Language projects will start with a 2 or 4 hour session on **Wednesday week two Easter term**, one day ahead of the other projects.

If you are interested in taking a foreign language project, you must either attend an information session (see Key dates), where all the language project leaders will be on hand to answer any questions you may have, or speak to someone from CLIC.

Project timetables for Easter Term

Time Slots	Monday	Tuesday	Wednesday	Thursday	Friday
09.00-11.00	**P2** (GA1, GB2, GF2A, GF3, GM2, SA1, GC5) **Field P5** (GD5 not currently running)	**P3** (GA4, GF1, GF2B, GG4, SC2, SF4, SF5, SG2)	**Lang P8/9** (SL1, SL2, SL3, SL4, SL5) (**NB**. These will also use other slots to suit students)	**P1** (GA2, GB1, GM1, GC3, GF4, GG2, GG3, SF2)	**P4** (GA3, GB3, GF5, GG1, SB4, SC1, SF3);
11.00-13.00	**P1** (GA2, GB1, GM1, GC3, GF4, GG2, GG3, SF2) **Field P5** (GD5 not currently running)	**P4** (GA3, GB3, GF5, GG1, SB4, SC1, SF3)	**Lang P8/9** (SL1, SL2, SL3, SL4, SL5) (**NB**. These will also use other slots to suit students)	**P2** (GA1, GB2, GF2A, GF3, GM2, SA1, GC5)	**P3** (GA4, GF1, GF2B, GG4, SC2, SF4, SF5, SG2)
Afternoons	**P2** (GA1, GB2, GF2A, GF3, GM2, SA1, GC5) **Field P5** (GD5 not currently running)	**P3** (GA4, GF1, GF2B, GG4, SC2, SF4, SF5, SG2)	**Field P5** (GD5 not currently running)	**P1** (GA2, GB1, GM1, GC3, GF4, GG2, GG3, SF2) **Field P5** (GD5 not currently running)	**P4** (GA3, GB3, GF5, GG1, SB4, SC1, SF3)

Note P6 (GD1) will run in the second two weeks and P7 (GD2) the first two weeks of the project period. Timings of the sessions for these two projects will be published as soon as they have been established.

Organisation

Each project has a project leader who is responsible for its organisation, running and assessment. Projects use a Moodle page to provide documentation, and normally use electronic submission for reports. Project leaders will confirm arrangements and deadlines for report submission at the first (compulsory) session.

Availability of computers and other equipment may be restricted at times outside your scheduled sessions, so you should allocate your unscheduled time flexibly between your two projects. Lead technicians can advise you on the hours of access to their laboratories.

Timetabled sessions and project workload

During the project period, approximately 8 hours per project per week are timetabled.

1. Students can expect priority access to laboratories, equipment and computers allocated to that project during all sessions.
2. Students can expect to have access to supervision from the project leader and/or other demonstrators during the morning and/or afternoon sessions as appropriate for the project.
3. Project leaders can expect to have access to all of the students on their project, as required during all sessions.

You are expected to be available for ALL timetabled sessions (unless prevented from doing so by illness or other grave cause). At the first (compulsory) session, project leaders will provide a detailed schedule indicating when you

must attend. A record of attendance will be kept for these compulsory sessions, and penalties applied for absence.

It is expected that students will typically spend around 20 hours per project per week, either in timetabled sessions or working on their own (including report writing).

Project reports

Lab notebooks

Students must provide themselves with a lab notebook for their projects. It is essential best practice in project management to use a lab notebook to record all day-to-day activities, as a sketch book for conceptual design work, to record calculations and experimental results etc, dating every entry. For some types of project, such as software projects, electronic records and documentation may be more appropriate. Project leaders may ask for notebooks to be produced at meetings or submitted with reports to check that the books are used correctly, with entries properly laid out and dated.

Interim and final reports

Most projects require 3 reports to be submitted, i.e. 2 interim reports and a final report. In the unlikely situation that report submission is not electronic, all interim reports must be appended to your final report when you hand it in. The maximum total length of all reports taken together (typed or handwritten on A4 pages) will normally not exceed 14 sides, plus calculations and drawings. Students must adhere to the specific limits given in each project.

Reports will normally be produced electronically, and students MUST take responsibility for retaining their own electronic copies as backup. Most project leaders will also expect reports to be submitted electronically (via Moodle).

Format of reports

The format of reports will vary from project to project, and the project leader will tell you what is required. Some general guidelines for design projects are as follows:

Interim reports (often 2 sides each, excluding appendices)

- Introduction: overview of project and aims
- Project specification
- Summary of preliminary design work
- Conclusions and programme of future work
- Appendices (include important sketches, drawings, computer listings, etc)

Final report (often less than 10 sides of A4, excluding appendices)

Suggested section headings plus guide lengths are:

- Introduction (1 side)
- Summary of overall design decisions and outline of project management (1 side, possible team material)
- Description of design/computer code (2-3 sides)
- Problems encountered in development and their technical solutions (1 side)
- Test procedure/software implementation (2 sides)
- Conclusions and recommendations for improvements (1-2 sides)
- Appendices (possible team material):
- Important design details, including mechanical drawings, circuit diagrams, software code
- Interim reports 1 and 2 (only if not submitting electronically)

See the Report writing guide for further guidance.

Report cover sheets

At the front of each report (interim and final), students *may* be asked to include a signed IIA project coversheet (to be downloaded and printed from this link, as required). The sheet contains:

- A declaration stating that the student is submitting his or her own work. (Work which has not been done by the author must be identified clearly. It is recognised that there will be some common elements between the work of students in a pair or group, for example in drawings and diagrams.)
- Space for markers to provide written feedback (but not marks) on your reports.
- Space for you to indicate suggestions for improvements to the project.

The **online survey** should be completed at the end of the project period.

Return of reports

Physical copies of reports, drawings, etc. (where not handed in electronically) will be kept until after the Tripos results have been published. Such project work will NOT automatically be returned to students. Some project leaders may recover reports from the Teaching Office.

Assessment

For each project, there are 80 marks available. In order to spread the workload for both students and staff, continuous assessment will take place for the duration of the project period, with a number of staged reports. Some projects include individual or group presentations as part of the assessment. Each project has its own mark distributions and submission dates, and these are stated in the online Project descriptions. A *typical* allocation is:

Report	Length	Marks	Due
1st Interim report	2-3 sides	15 marks	Thursday, project week 2
2nd Interim report	2-3 sides	15 marks	Thursday, project week 3
Final report	10 sides	50 marks	Thursday, project week 5

The main criteria for assessment will be the quality of the project work done, and the quality of the technical report writing. Marks will typically be awarded as follows:

Standard	Marks out of 80
Class I	56+ (70%+)
Class II.i	48+ (60%+)
Class II.ii	40+ (50%+)
Class III	32+ (40%+)
Below honours	0-31 (0-39%)

Notes

- **No report, no marks**. Half marks will not be awarded.
- For non-attendance at compulsory timetabled sessions, the penalty is 1 mark per hour or part hour missed.
- For late submission of interim reports, the penalty is 3 marks per day.
- No reports will be accepted after the submission date for the final report. Please see the policy on extensions.
- Feedback will be given on each report, but the marks will not be disclosed.
- The marks for different projects may be moderated after the conclusion of the project to even out any significant differences in mark distributions.

Part IIA Project and Coursework Extensions

Part IIA Coursework Overview

During the Michaelmas and Lent terms, Part IIA undergraduates submit a minimum of 8 reports/essays associated with modules, and 2 full technical reports (FTR), and complete an Extension Activity (ExA). During the Easter term, students undertake 2 projects. Students are expected to make all reasonable efforts to complete missed experiments, FTRs and ExAs at a later date, and should contact the member of staff in charge of the activity concerned as soon as possible to arrange rescheduling. As these activties are typically booked by students rather than being timetabled we would normally expect students to simply rebook their lab session and the teaching office does not need to give permission for this. If a student experiences difficulty in rebooking a session in consultation with the lab leader for the module they should contact the teaching office. As deadlines for coursework submission run from the date the associated lab is actually undertaken, no deadline extension request need be made where a student has simply rebooked a lab session. Where a student fails to complete an activity they would need to consult with their Tutor regarding an approach to EAMC, the department does not award marks for activities that are not completed.

Deadline extensions for coursework and FTRs due to illness or other reason must be approved by the teaching office following the extensions policy detailed above. An approved deadline extension will result in the removal of any late submission penalities.

Work for which an extension has been approved is due at the same time of day as the original deadline, usually 4pm.

Part IIA projects

Students are expected to complete as much as possible of the work associated with their two projects, but the four week timetable imposes tight constraints.

Missed Sessions

Mark penalties are applied for missing compulsory sessions. If a "re-arrangement" of a session is approved by the teaching office (via the online form) penalty marks will not be applied for a missed session as it is assumed that a student will attempt to catch up at a later time.

Significant disruption

If disruption to your project work is sufficient that there is a significant risk that you may not be able to catch up all of the work and complete the project, you must **notify your Tutor, project leader(s)** and the Director of Undergraduate Education by email immediately. You may need to apply for an appropriate allowance via the EAMC process in this case.

Deadline Extensions

Extensions under the department policy are not possible in relation to IIA project interim and final reports due to the proximity of the final examiners meeting, knock on effects on the projects and very tight marking schedule. This constraint is due to minmum time requirements for marking and classing.

Purchasing guide for Part II project students

How does purchasing work in CUED?

Purchasing is done through a system called the Engineering Department Requisitioning System, or EDRS for short. It is accessible only to some staff and graduate students, with no exceptions. This system offers access to the university-wide purchasing system known as the Marketplace,as well as to a long list of other companies that are "on the system".

If you want to buy something, the first step is to decide what you want, and then find a supplier to sell it to you. This is done in the usual way, via a search engine of your choice. It's best to look for big, well known national suppliers, or suppliers local to Cambridge.

Once you have selected your product and supplier, you try them in the system. First try the marketplace route, which is by far the easier option if it is possible. If you are able to find the product on marketplace, then it doesn't matter which supplier it's from, and the order will go through without issue. Most marketplace suppliers deliver within the next two working days.

If you cannot find the product on marketplace, then search the list of companies that are "on the system" for your desired supplier. If yours is not on the list, try and find a different supplier that is. If you cannot find a supplier on the system for your desired product, you must choose a different product. Table 1 shows a list of commonly used suppliers that have well-indexed websites.

Table 1: A list of commonly used suppliers.	Supplier	Typical Items
	RS	Hardware e.g. Screws, Motors, Switches etc.
	Farnell	Discrete electronic components e.g. ICs, Resistors etc.
	Comar	Low-Cost optics e.g. Lenses, Filters, Gratings
	Thor	High end optics
	Sigma	Chemical supplies
	CUED Stores	Various metal stock e.g. Sheet, Bar and Round

Once an appropriate supplier has been found, they must be contacted for a quote to supply the desired product. This can then be entered into the system and the order will be processed, though non-marketplace suppliers will often take longer to supply than marketplace ones. This lag, coupled with the delay that typically results from having to procure a quote, means that non-marketplace orders typically take as long as one working week to process.

How do students purchase for their projects?

As undergraduates are not permitted to access EDRS, they must work with someone who does have access. Different people will have different preferences on how they want this to happen, but it is always best to have a list of the products you want to buy in advance of contacting them. If possible, have either a product code or directions to information from a supplier, as this will make the process much quicker. Once the order has been placed, the person that placed the order will be notified by email when it arrives. They may instruct you to collect it from Stores (next to the workshops), where you will need the Purchase Order number, and you will be asked to sign to show you have accepted the order.

Are there any ways of getting things which aren't on EDRS?

In broad, yes, though they are not easy. It is usually better to find an alternative product than to try to purchase one that cannot be found on the system. Contact your project leader, supervisor or demonstrator if no alternatives can be found.

Source URL (modified on 29-08-24): https://teaching.eng.cam.ac.uk/content/part-iia-project-guide