UCL DEPARTMENT OF PHYSICS AND ASTRONOMY

Courses PHASM201 and PHAS3400: Final Year Projects Session 2008-9

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1. Aim and Context of the Course

All Physics Laboratory Courses within the Department contribute to the continuing development of the students' practical and project skills, extending throughout the three/four years of the BSc/MSci degrees. Collectively the courses have the overall aim of equipping the student with those practical and project skills which will open up a wide range of employment opportunities, both in scientific research and development, and in a wider context. The two-term research projects, PHAS3400 and PHASM201, contribute to this aim by providing students with the skills needed to plan, execute and present a complex and open-ended scientific investigation.

2. Objectives

At the end of the course the student should have:

- developed the skills and confidence needed to plan and work independently, or with a single partner.
- improved their ability to conduct a complex and open-ended scientific investigation, in an active research environment.
- increased their ability to seek out information as required, from a variety of sources.
- become accustomed to developing ideas through discussion.
- acquired the technical skills required to complete their project.
- have further developed the reporting skills practiced in earlier lab courses, by distilling their lengthy notebook record
- of the project into a word-processed formal report which is concise but complete.
- have enhanced their presentation skills, by making a full-scale oral presentation to an audience of academic staff and peers.

3. General Information and Choice of Projects

The third and fourth year courses, PHAS3400 and PHASM201, will normally consist of advanced project work. Note that PHASM201 projects will correspond to 1.5 course units , while PHAS3400 projects correspond to 1.0 course units. Project work should occupy approximately 10-20 hours per week for the whole of the first and second terms (with PHASM201 students expected to spend closer to 20 hours on their projects). The projects are coordinated by Dr Mark Ellerby (mark.ellerby@ucl.ac.uk).

Projects are broadly classified as "experimental" and "theoretical". For experimental topics students normally work in pairs, and as far as possible and appropriate, students may choose their own working partners. However, students are expected to write-up their reports independently. Students on theoretical projects work alone.

Projects can be chosen from those suggested by staff and shown on these Web pages. Alternatively, students may wish to discuss their own ideas with prospective supervisors. Supervisors areas of interest can be discovered in the Departmental web pages; http://www.ucl.ac.uk/silva/phys/research

Potential projects will be announced before the end of the summer term, and students should have chosen their project by the beginning of autumn term; **preferably before the end of the summer term**. Students should discuss the suitability and availability of a project with the appropriate supervisor. Once they have made a choice they should inform the supervisor and coordinator by e-mail. This choice will be final, and on no account should a student accept more than one project.

Each project will be overseen by a named supervisor, with whom the aims, objectives, and proposed methods must be agreed. The supervisor will be responsible for monitoring the progress and safety of the project, and will provide advice and assistance as necessary. The supervisor should be available for regular (~weekly) meetings with the student. A second supervisor will also be appointed for each project. He or she will independently assess your project work, but will not normally take a proactive part in its direction. If a student has any questions or problems concerning his or her project, but which cannot be dealt with by their supervisors, then they should contact the Projects Coordinator as soon as possible.

For most established experimental projects, apparatus is likely to be available, but in some cases it is expected that design and/or construction of new equipment will be necessary. For this purpose all of the services offered by the Department (Stores, Workshop etc.) will be available. However, where possible, projects must be planned to use existing College/Departmental resources. Purchases of equipment or software for use in projects must be agreed beforehand with the Director of the Physics Laboratory. Supervisors should be aware that resources for any one project are likely to be limited, and that escalating costs once a student has embarked on a project are difficult to cater for. No equipment or software will normally be provided for use outside the College (in particular, no software will be provided for use on privately owned PCs). Jobs for the workshop should be channelled through the Physics Laboratory Superintendent (Mr. John O'Brien).

In the case that a student has conducted summer work in the same general field as their final year project, a report explaining the scope and outcome of this summer work is required before the project starts.

4. Assessment

The Project will be monitored and assessed continuously, via the following components:

- project outline
- progress report
- project report (85)
- project talk (15)

The figures in brackets represent the percentage of course marks allocated to the written and oral components. Written work will be assessed independently by the supervisor and second supervisor, and a final mark arbitrated by the Projects Coordinator.

PLEASE NOTE A project outline and progress report are used to monitor progress and are required for course completion, so should be delivered on time. Assessment of these is included in the final project reports. The total 85 marks awarded for the written work, will be broken down as follows:

- Scientific contribution by student and understanding of context: 35 marks
- Quality and amount of work: 30 marks
- Standard of presentation (including the project outline and progress reports) also including referencing: 20 marks
- Failure to submit an outline and progress report on time, without mitigating circumstances, will be penalised by the loss of up to 5 marks in the final report.

5. Safety

Safety notes for student and staff are intended to supplement the notes in "Safety Information for Undergraduate Students" and the "Staff Handbook" respectively.

6. Project Timetable

- The normal order of events is given below (see also important deadlines).
- Post-examination period in the Third-Year - a list of projects is made available; students choose partners and projects (by consulting with supervisors if necessary). Having chosen your project, inform the supervisor and course coordinator by email.
- Students who have not managed to settle a project during the first week of the first term will be allocated one by the Course Coordinator.
- 3rd week of the first term - submission of project outline (see section 8).
- First week of Second Term - submission of progress report (see section 9) mainly to provide feedback for students (see section 8).
- Penultimate week of the 2nd Term - Project Talk (see section 10).
- Not later than the last week of the 2nd Term - submission of Project Report (see section 11).

Work should be handed in to Elizabeth Blackwelder (Physics) who will date stamp it and pass it on to your supervisor.

Adherence to the above timetable is essential. Work submitted late will be penalised, at the rate of 2% of the mark awarded per full working day. Please contact the Projects Coordinator and Tutor immediately if there are mitigating circumstances that delay the project.

7. Methodology

The PHAS3400/PHASM201 project can be regarded as a genuine piece of original research. Indeed, in many cases the suggested investigation derives from the supervisor's own research. It is expected that students will work largely under their own guidance, so far as day to day progress is concerned. The supervisor's duty will be to ensure that time is not wasted on following unprofitable lines of investigation and to advise on suggested ideas and methods.
Naturally, many of the broader ideas will come from the supervisor who will be looking for mature criticism, amplification and, eventually competent implementation of these ideas. Students should be aware that it is their responsibility to see their supervisor regularly (weekly) during the progress of the work. The qualities to be demonstrated and assessed are: originality, initiative, efficient organisation of thought and deed and the ability to report concisely and effectively. In addition, supervisors will attach a great deal of weight to the standard of technical achievement demonstrated. Thus an experimental student would be expected to produce some (perhaps not all) of his or her engineering drawings to an acceptable professional standard and to construct circuits properly boxed, on printed circuit boards. In a more theoretical project, the equivalent

might be computer programs properly structured, sensibly sub-routined and adequately documented (or extensively commented).

Students working in pairs should endeavour to divide the work in such a way that each has a clearly defined objective contributing to efficient solution of the problem in hand. Supervisors will look critically at the independent contributions of each student in a pair and the work should be organized accordingly. Students working in pairs should present separate written work.

8. Project Outline

The first week or two of the project will, no doubt, be taken up with understanding the background to the project and the supervisor's ideas for the work to be done. Having got this clear, it will be necessary to make a detailed project outline from which the actual project work can commence. The outline must be as quantitative as possible. The objectives of a project outline may be summarised as:

- to confirm the final title of the project and the names of the first and second supervisors. Students who do not submit this information will be called in to see the project coordinator.
- to demonstrate a clear understanding of the problem to be solved.
- to outline briefly an initial approach to the problem, backed by calculations, sketches and, sometimes, preliminary data.

As a very rough guide, the design study should be about two sides of A4 paper, including possibly diagrams. For students working in pairs, each student should submit their own outline, if possible highlighting the areas which they intend to tackle.

9. Progress Report

This is intended to be rather short submission (3 to 4 sides). It should address, primarily, three questions:

- how closely has the initial design study been followed with reasons for any deviation?
- how much progress has been made at the half way stage towards achieving the ultimate aim of the project?
- what are the plans for future work on the project?

In conjunction with the progress report there will be a short 5 minute interview to ensure there are no snags and check on how you are getting on.

As a result of this summary of progress, the supervisor could well modify the objectives or, in extreme cases, suggest a different project altogether. PLEASE NOTE Students should submit TWO copies of the progress report so that one copy can go directly to second supervisors, at the same time as a copy goes to the first supervisor.

10. Physics Project Talks

All students taking the PHAS3400 and PHASM201 units will be required to give a talk about their project at the end of the second term. Their audience will consist of any final year students and academic staff that wish to attend. In their future careers most students will be required to give presentations on their work in front of a large audience, and these projects talks will provide valuable experience. A pair of students working together on a joint project should give a single coherent presentation, dividing the material of the talk sensibly between them and in a manner, which reflects their individual contributions to the whole project. A strict total time limit of 25 minutes will be followed by a 5 minutes question period. Students working alone will be allowed 15 minutes for their talk, again followed by 5 minutes of questions.

The following points should be borne in mind when preparing a talk:

- The talk should be structured as follows:

introduction, giving the background to the project.
description of the work carried out and results.
discussion of results and conclusion.

- Do not make the talk too detailed, nor too trivial. The members of the audience will not be specialists in the subject of the project, but you may assume that they are familiar with most core undergraduate material.
- A laptop projector and overhead projector will be provided in the lecture room. With such a short time for each talk, it is of course advisable to prepare all presentational material in advance. Contact your supervisor if you do not own a laptop and wish to use one. Make sure that all material is legible and not overcrowded with too much information. Also, do not attempt to use too many slides or transparencies.
- Practice your talk in front of a critical colleague to ensure that the content and length are acceptable.
- During the talk, face the audience and speak clearly and loudly enough to be heard at the back of the lecture room.

11. Project Report

The report should be written at a level to be understood by someone with a good knowledge of physics, who is not a specialist in the field of the project. Avoid, at one extreme, explaining very elementary things and, at the other, not explaining very abstruse things. The report should normally include:

- An abstract (in a single page), setting out the purpose of the project, the
- work carried out and the main conclusions
- Background material setting the project in perspective.
- Details for the work actually done.
- Results of the work.
- Discussion of the significance of the results.
- References (see below).
- An appendix (optional) with eg. lab. notes, important computer codes etc.

All are important. The relevant balance will depend on the subject of the project, but the Examiners are particularly interested in knowing about the student's own work. The length of the report should not normally exceed 50 pages of text and should be word-processed (excluding the appendix). It must be presented clearly, neatly and in a well-ordered fashion.

Note that though there is no longer a requirement for all students to submit a laboratory notebook, it is expected that students on experimental projects will include some of their lab notes for inspection, as part of the Appendix. If in doubt, you should discuss with your supervisor whether this is appropriate for your project. The general appearance, quality of production and use of English will be taken into account in the assessment. Careful discrimination should be exercised when deciding what to include in the report. Minute technical detail is not usually required but, if it is of significance, it might be more appropriately recorded in the appendix rather than in main text.

References to published works that were consulted during the course of the project should be clearly indicated at the points in the text of the report and a list given at the end. References should be specific - the mere title of a book is of little value as a reference.

Students working as a pair on a joint project, while sharing data, must each submit independent reports. If one of the pair has been responsible for a particular aspect of the project, this contribution should be acknowledged by the other. PLEASE NOTE that students must submit TWO copies of the final report so that one copy can go directly to second supervisors, at the same time as a copy goes to the first supervisor. In addition the supervisor

Students must adhere to the College Regulations on Plagiarism, and in line with this policy we will require that the student submits a signed submission stating that the work is theirs and not plagiarised. This form will also require the acceptance that the work will be submitted to electronic analysis. In order to complete this analysis, the student must submit an electronic copy of the project as an attachment to ***Elizabeth Blackwelder for Physics*** **(**e.blackwelder@ucl.ac.uk**)**. The electronic version of the project must be in one of the following formats:

- Microsoft Word (.DOC), Wordperfect, Acrobat (.PDF), Postscript (.PS), .HTML, .RTF or plain text formats

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