

Level 4 Project Guide

The Level 4 individual project is an important part of your degree. This guide summarises some of the essential information about the project.

The Level 4 project is 40% of your Level 4 grade. This has a major effect on your degree classification. **Note that if you fail your project (a grade less than D3), you will be ineligible to receive an Honours degree.**

Time allocation

You should expect to spend at least 400 hours working on your project. This corresponds to **16** hours a week during regular term time. You will have a period from Week 11-Week 13 of Semester 1 without classes. You are expected to work full time on the project (at least 40 hours a week) during this period. Do not squander this time; prepare for it well and use it fully.

Assessment

The project is assessed in three parts:

- 5% Oral presentation
- 85% Dissertation
- 10% Professional Conduct

Note that virtually all of the marks are awarded for the dissertation. *No marks at all are awarded for the product itself -- but you must produce a significant product to be able to write the dissertation.*

Learning outcomes

These are the learning outcomes for the Level 4 project. You need to show that you have achieved these goals in the project assessment.

Students should be able to:

- Manage and organise a large independent solo piece of work
- Choose among technologies, tools and approaches and apply them effectively
- Synthesise technical skills appropriately to address a single challenging problem
- Develop a substantial product which demonstrates technical achievement in computer science.
- Appropriately evaluate the outcome of their work
- Conduct themselves in a professional manner, taking responsibility for the progress of the project, recording their time and effectively using their supervisor's input
- Write a coherent, literate dissertation that documents the project, justifies decisions made and sets their work in context
- Present their work orally to a technical audience, communicating their project precisely and fluently
- Produce concise, informative video summaries of their work

Project types

There are two broad styles of projects:

Engineering style projects, where the output should be a significant software artifact (strong design, programming and testing focus)

Research-style projects, where the output should focus on a research contribution (strong analysis, often empirical work)

All projects must have an evaluation portion. This is specifically assessed in the marking scheme.

Please consult the appropriate column of the table on the next page for your degree programme. The project descriptors for Computing Science and Software Engineering/ESE are slightly different.

Computing Science

CS: Scientifically focused research projects

A research-type project is one whose main purpose is experimentation or investigation into a (possibly) ill-understood problem. Even in these projects the student will be expected to produce intermediate documents indicating progress.

Finally, the student is expected to submit a dissertation describing the results of the investigation. The educational justification for such projects is training in research methods and often good research-type projects can lead to a publication.

CS: Product-focused projects

A software engineering or product focused project is one whose main purpose is to design and implement a software system that solves a (more-or-less) well-understood problem. The student is expected to proceed

Software Engineering/ESE

SE: Research in Software Engineering principles, methods or tools

These projects are essentially identical in structure to Computing Science dissertations, but should address a research problem connected with the practice of Software Engineering. This definition can and should be interpreted very broadly. A project, might for example investigate:

- A new method for managing user stories across distributed teams using augmented reality technology.
- A domain specific language, or tool set for creating software in a particular problem domain.
- Novel techniques for discovering security vulnerabilities in code bases.

The assessment for research led projects follows the same scheme as for research led computing science projects, with emphasis on addressing a research question.

SE: Product-focused projects

These are focused on the delivery of a production quality software product. Product-led software projects must have an identified customer with a real-world need. This may be an external organisation, university academic or business unit, or the

in a well organised manner, passing through a series of phases each of which culminates in a deliverable document.

Finally, the student must submit a dissertation that includes a project report together with the implemented software and appropriate documentation. The educational justification for such projects is training in professional software engineering methods.

academic supervisor. The same high level structure is used to assess product led projects, but the categories are interpreted differently, because there is an expectation that the project will focus on the development of deliverable software, rather than answering a research question:

- **Analysis:** A review of related products and a clear and comprehensive documentation of product requirements.
- **Product** The extent to which the software code base is *deliverable*, i.e is of production quality and can be handed over to the customer for use and on-going maintenance through the application of good software engineering practice.
- **Evaluation:** efforts to demonstrate that the software meets customer requirements through rigorous and documented acceptance tests; identification of future work (features, enhancements).

If you are a Software Engineer, and in doubt about the suitability of your project for either Software Engineering category, please contact the SE Programme Coordinator.

The project module

The individual project is *your* work. Unlike most of the courses you have taken, the responsibility for running the project module lies squarely with you. We provide support, but you will have to manage and organise your own work. You will have a project supervisor who can give you guidance and direction, but you must demonstrate that you are independently leading the work. Make good use of your supervisor -- they will have limited time available, so make sure you prepare well for meetings and take on board guidance offered.

What we offer you

A choice of projects to undertake. Assignments will be made taking your preferences into account. This is not a guarantee that you will get the project you want, but every effort will be made to do so. The allocation is done algorithmically to ensure fairness in the allocation.

Weekly supervision. Your supervisor will meet with you once a week during term, for a duration of up to half an hour. Any other contact with your supervisor is exceptional and at their option.

Fair marking. Your project will be marked by two members of staff, using the guidelines you can see on Moodle, and a formal reconciliation process (which may include a third independent maker) will be used to award a final grade.

What you need to do

Act professionally and independently. You are expected to work in a professional manner, leading the work, managing your own time and using your supervisor's time effectively. You must follow rules on academic plagiarism and ethical approval (and intellectual property/non-disclosure agreements, if applicable to your project).

Produce a significant product A good project requires a serious product, which demonstrates technical sophistication in computer science appropriately applied to a problem. You need to show that you can both build something substantial, and that you can build the **right** something.

Write an excellent dissertation The dissertation is the only part of your project that is marked, excluding the specific marks for the presentation and professional conduct. You must demonstrate that your product is excellent *through* the dissertation. If you write thousands of lines of excellent code and a scrappy dissertation, you will do poorly. Conversely, if you write a few lines of scrappy code, you will be unable to write an impressive dissertation regardless of how polished the writing is.

Professional conduct

We explicitly assess your professional behaviour in the project module, and it counts for 10% of your grade. Good professional conduct varies, and your supervisor may give you more specific advice, but we provide some general guidance. **Be aware that failure to take this guidance on board may affect your professional conduct grade!**

Attendance at meetings

If you cannot make a meeting, please rearrange a suitable time with your supervisor with reasonable notice (your supervisor may also need to rearrange on occasion). If necessary, a meeting may be cancelled, but **avoid cancelling more than one meeting consecutively**. If you do not have a meeting for two weeks, the project coordinator will be informed. If a meeting is cancelled, email a status report and/or any questions to your supervisor.

Minuting meetings

You are responsible for taking minutes of meetings. **You should do so**. It is hard to remember everything said in meetings without notes. How you take minutes is up to you -- handwritten notes, Google Docs, etc. Be ready to share minutes with your supervisor, so you can make sure you are both on the same page.

Preparation for meetings

You should prepare questions to ask at meetings, and have progress ready to show and discuss (or if no progress has been possible, have prepared questions that will help you move forward). It is good practice to have **written** questions and status report, even if brief, coming into a meeting.

Logging your time

You should log all of the time you spend on the project, and be prepared to show your log to your supervisor weekly. Document each hour you spend on the project, **as you do it**, writing a very brief summary of what you did and what was achieved. For example:

Date	Duration	Summary
18/10/2017	4 hours	debugging gcc flag parsing: no progress :(
19/10/2017	1 hour	running string matching test code again
19/10/2017	2 hours	writing new warning flag module (commit: 9fea8)
20/10/2017	1 hour	reading gcc documentation: discovered bug is not in parser
23/10/2017	5 hours	wrote module to add ARM flags back in (commit: 24e4f)

If you use version control (see below), include commit references in your log. Although not explicitly marked, your log should be submitted with your project, and may be taken into by your supervisor account in awarding a professional conduct grade. You might, for example, want to create a Google Sheet or Excel sheet to track your time easily.

Use appropriate tools, particularly version control

You should use best practices and appropriate technology for the work you are doing. In particular, **you should use version control**. The specific VCS you use is up to you and your supervisor, but unless there are exceptional reasons you absolutely should use one. Your supervisor may wish to have access to your project repository (e.g. so they can clone and test your code); be prepared to accommodate this. If you intend to use a public VCS server (e.g. GitHub) discuss this with your supervisor before doing so, in case there are any confidentiality issues; in general this should be perfectly acceptable.

Set up a repository at the very start of your project. Do not write any code without a VCS in place.

Reference management

As part of your project, you will need to manage a bibliography of references. The scope of this bibliography will vary depending on your specific project. It is **strongly** recommended that you use a reference manager like Zotero, Mendeley or EndNote to manage your references, *from the very start of the project*. These managers can be used to organise your research, annotate references and automatically produce BibTeX ready for inclusion in your report. Note that you can be penalised for an inaccurate or poorly formatted bibliography in the dissertation portion of the marking scheme; a reference manager will minimise that risk.

Interaction with clients

If your project involves interaction with clients, your professional conduct will include your conduct in client meetings. Make sure you are thoroughly prepared for client meetings, minute meetings and share the minutes with the client (if appropriate). Bear in mind that your actions in client meetings affect the reputation of the University as a whole.

Plagiarism

You should check the University plagiarism policy **very carefully**, and rigorously adhere to the rules. Uncited text and figures have cost students dearly in Academic Conduct proceedings in recent years. The University has no tolerance for plagiarism and the rules are enforced vigorously. Plagiarism in the final project can jeopardise your entire degree.

Ethics

If you are doing a project that involves any human participants at all, your research must comply with the School Ethics procedure. See <http://www.dcs.gla.ac.uk/ethics/> for details of what this entails. In most cases, a checklist procedure is sufficient, but it is your responsibility to make sure appropriate ethical approval has been gained. **You should include evidence of compliance with ethical procedures (e.g. signed checklist or an approval notice) in the appendices of your dissertation.**

IP, commercial partners and employers

Projects with external partners are welcomed, and can offer interesting challenges and real-world experience, but there are some additional complexities which should be borne in mind. For the purposes of this discussion a “partner” is anyone involved in the project other than you and your academic supervisor(s).

IP

By default, **you** will own all intellectual property developed during the project (not the University or your supervisor). You may be asked to transfer IP rights as part of an agreement with a partner. You cannot be made to do this, but if you do not you will be in all likelihood be unable to work with that partner.

NDA

In certain rare cases, you may be asked to sign a non-disclosure agreement (NDA) with a partner before beginning work. This again is at your option, but not doing so will preclude you from continuing the project with the partner. If you do sign an NDA, you must adhere to it **rigorously**. There are usually severe legal penalties for violating the terms, and you should be careful even discussing the work with classmates. Your supervisor can give you more precise information if this applies to you.

Partners

A project with a partner **cannot** simply work as if you were an employee of that partner. You must be demonstrating independent development of the work, and not following specific weekly directions from the partner. The overall topic and direction can of course be given by the partner. Your supervisor can give you guidance on what level of direction is appropriate for your specific project.

Particular care should be taken if you are actually a *current employee* of the partner. It must be crystal clear that the project is directed by the academic supervisor for your academic benefit, and **not** for the (sole) benefit of the employer (e.g. it doesn't matter that feature X is needed for a release next week -- if it's not directly relevant to producing a good project dissertation).

Students will need to seek special permission from the project coordinator to undertake projects with their current employers as partners.