

School of Computer Science and Electronic Engineering

Final Year Project Guidelines

for

CE301

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(Keep this document for future reference)

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Key Points

This document introduces the organisational details concerned with Year 3 projects. Details are given regarding project organisation, who to contact should you have problems, the timing and details of the reports you need to submit for assessment, progress monitoring and guidelines on how to approach your project work. The main points to remember are:

DO keep in close contact with your supervisor.

DO keep a logbook or portfolio of your work and observations.

DO make the best use of the available time.

DO look after the equipment you are issued with and ensure it is secure.

DO keep your work location tidy.

DO maintain a high standard of design and construction in both hardware and software.

DO observe safety at all times.

DO remember that you are required to pass both project and examinations to obtain a degree.

Important Dates for CE301

- Week 3 – submit initial report (GEN x2 & E), by 11.59.59 (noon) on Friday,
- Week 9 – submit interim report (GEN x2 & E), by 11.59.59 (noon) on Friday,
- Week 23 – submit poster (E), by 11.59.59 (noon) on Wednesday,
- Week 25 – give poster presentation at Project open day, Monday 2.00 – 5.00pm,
- Week 30 – submit final report (GEN x2 & E) and log book, by 11.59.59 (noon) on Wednesday,
- Week 31 or 32 – give presentation and demonstration of project and attend oral examination

1. Introduction

These guidelines provide general information for all final year students with reference to their final year project. The final year project forms a major part of the degree scheme assessment being a 30 credit module. Many students find the project the most interesting part of their undergraduate experience, as they can be creative, carry out research and/or undertake circuit and system design. The project can also be seen as an introduction to the type of work you will find in graduate employment.

The problem with projects is time management. Some students allocate too little time at the beginning, resulting in little progress and a mad panic at the end. Other students spend too much time on it at the expense of other courses. It is essential that you organise your workload so that project work and other course work is balanced with examination preparation. Both project and exams have to be passed to graduate.

2. Objectives

The project tests your ability to apply knowledge gained from the courses and independent study to solve a realistic design problem. Projects are more open-ended than laboratory and assignment work in earlier years, and a detailed plan of action is not normally supplied to you. Instead, the project specification and your work plan is decided between you (or your group) and your supervisor. The project is intended to be similar to industrial or commercial projects which solve a particular problem, investigate the feasibility of a particular solution or produce a product to meet a customer's requirements. All projects normally involve an appraisal of relevant background literature and/or appropriate theory, solution specification, solution synthesis / design, solution implementation / production / construction, and experimental verification / evaluation. You may also have the opportunity to gain experience using relevant equipment and/or software, which is likely to be of immediate use after graduation.

3. Responsibilities of students, supervisors, second examiners and customers

Students

You must see your supervisor regularly throughout the Autumn and Spring terms (weekly preferably) in order to discuss your progress and to identify solutions to any problems. It is helpful to set up a meeting schedule at the start of each term, to guarantee this happens! At these meetings you must have your logbook or portfolio available otherwise your supervisor will cancel the meeting and record the fact in his project log. (An appropriate logbook can be purchased from Mr Tony De Roy for £1 each.) Your logbook or portfolio must contain all details relating to your project including a record of each of your meetings with your supervisor. Towards the end of each meeting you and your supervisor should form a 'to do' list or activities to be attempted before your next meeting. Your supervisor will expect to sign and date this record as your logbook or portfolio will form part of your assessment. Obviously at your next meeting your supervisor will expect you to provide an update on your progress towards completing the actions agreed at the previous meeting.

For hardware work, it is expected that you will use a high standard of construction. Circuits which result in a bird's nest of wire and components will not create a good impression with the examiners, nor are such circuits likely to be reliable. If you need to produce a printed circuit board appropriate design software and prototype manufacturing facilities are available.

The same high standard is expected of software. Large quantities of badly written and undocumented code are as difficult for someone else to work with as is untidily constructed circuitry!

Supervisors

Their main responsibility is to ensure that you are making satisfactory progress and are heading in the right direction. The role is similar to a project manager in industry. The supervisor will agree a project description, objectives and time scale with you. Meetings are held to help with progress, and to suggest approaches to solving problems. It is not, however, the supervisor's responsibility to provide detailed solutions, it is after all, your project! Specifically, supervisors will:

1. Give overall guidance concerning the direction of the work.
2. Check regularly on your progress and sign your logbook or portfolio.
3. Discuss with you chapter and subsection headings of reports.
4. Give general advice on the presentation and discussion of the results.
5. Give general guidance about the formal presentation, demonstration and oral examination.

Supervisors will **not**:

1. Read and comment on whole reports, or on portions thereof.
2. Correct typographical, grammatical or syntactical errors.
3. Predict the outcome of the oral examination, or "guarantee" that the final report will pass.

Second assessors

The second assessor is another staff member who provides independent assessment of your progress and written reports. You will not have contact with the second examiner, except through feedback about your written reports and project demonstration. The oral examination is held by the supervisor and second examiner.

4. Laboratory: Location, opening times, security and safety

Location

This will depend on what type of project you are doing. You may be working in your supervisor's research laboratory, which will possibly have the necessary equipment (and possibly research students). Otherwise you will be able to work in any of the laboratories for Software projects or Lab 8 for Hardware projects. There are weekly timetabled slots in Lab 1 and Lab 8 for the Autumn term to encourage you to start your project. I will visit these labs during these timetabled slots to monitor activity. Supervisors may also arrange to see you during these times.

If your supervisor recommends you use a replaceable hard disk module then he/she must request that on your behalf from the department's Computer Support group located in room 5.511 accessed through the entrance to the Department off Square 2.

Opening times

Your timetable should give some uninterrupted blocks of time for project work. If you are in a research laboratory, you should check on night opening times and access with your supervisor. If you are in the project hardware laboratory the opening times are from 9.00 am to 5.00 pm, Monday to Friday (term time only).

Security

All equipment you use, apart from PCs available in Computer Labs 1 and 2, will be booked out to you (by Mr De Roy or a member of the Computer Support staff). Do not borrow or move any equipment from another bench or laboratory without the permission of either Mr De Roy or a member of Computer Support staff. The responsibility for the security of all borrowed equipment is entirely with you. If any equipment is found to be missing, report it immediately to the appropriate person. A locker may be supplied through Mr De Roy in the laboratory for you to store equipment. There is a £5 returnable deposit for a locker but you must supply your own padlock, which you should remove at the end of the year. Often it is more convenient to chain large equipment to the bench, rather than putting it in lockers each time you leave the laboratory. It is recommended that you acquire a bicycle lock and chain for this purpose (for advice please talk to appropriate staff). You must not remove any equipment from any laboratory without permission.

Safety

Mains voltage may be present in almost any item of equipment. In addition, computer terminals, oscilloscopes and other cathode ray tube equipment will have voltages in excess of 10 kV. You are not permitted to remove the cases of equipment, or to wire mains plugs, or to replace mains connectors or fuses. Please contact Mr De Roy to carry out this work.

If your project is involved with lasers, there are special safety precautions to bear in mind. Please discuss with your supervisor the safety aspects of laser experimentation, before starting any practical work.

No food and drink should be taken into any laboratory at any time. The safety guidelines in the *Undergraduates Students' Handbook* must be observed at all times.

5. Laboratory: Components and equipment, facilities and personnel

Ordering Items for your project

It is possible that your project requires items to be purchased. In the first instance, discuss these with your supervisor and if it is decided that they are essential, your supervisor will contact the Project Coordinator (Anthony Vickers) to request their purchase. Purchases over £50 are not normally granted unless there is a case for the item being used over a number of years. For Hardware projects Mr De Roy holds a limited stock of resistors, capacitors, and transistors.

Equipment

Basic general purpose test equipment in the form of power supplies, oscilloscopes, signal generators and multimeters are available for hardware projects from Mr De Roy, who will also provide instruction on their use. There is also a selection of specialised test equipment available. These include a logic analyser, an analogue signal analyser and a fast digital storage oscilloscope. These facilities are for general short term use. We can also provide access to a full range of CAD tools.

If any equipment is found to be faulty it must be reported immediately to Mr De Roy.

Tools

If you are involved in circuit construction, you will need a set of tools. These are not provided by the Department. Please discuss with your supervisor what you might require to purchase.

Printed circuit boards

If your project requires a PCB details of the procedures to use can be found at

https://www.essex.ac.uk/dces/studetn_intranet/techinfo/.

If you require advice please see Nick Warren (Room 1NW.4.7). He will advise you on having circuit boards made either in-house or by an external company. The company we use is

<http://www.pcb-pool.com>.

The online price calculator is here

http://www.pcb-pool.com/ppuk/order_productchoice.html

Data sheets

These are available on the internet.

Personnel

For advice on the following facilities, please contact

Mrs Beverley Colley	* Personal computers for project use
Mr Tony De Roy	* General and specialised test equipment
Mrs Jayne Bates	* CAD and Multimedia

For any other facility problems, please see the Resources Manager, Dr Andy Tams

6. Logbooks and Portfolios

Logbooks and portfolios are required in the real world of employment. They provide full details of the work carried out for, for example, an employer or a customer, they can be employed in quality assurance audit trails, and they can even be used to certify the discovery date of an invention to the patent office! Also, if you are ill someone else may need to take over your work – they will only be able to do that if they are provided with an accurate and complete status report.

Suitable Logbooks can be purchased from Mr De Roy for £1 each although alternatives can be obtained from other sources. You **MUST** keep a logbook to both serve as a record of your project work, and as a data source for meetings with your supervisor. The logbook (and portfolio) should include an index, or table of contents which is kept up to date as the project progresses. All pages should be numbered so that the main items can be listed in the index.

The logbook or portfolio needs to be clear, tidy and dated. The entries should be sufficient for an outsider to fully understand what you have done. The logbook or portfolio should be your main source of information when you write your reports. If you do want to use scraps of paper, then just paste or sellotape them into your logbook as soon as possible. Many students use pencil, for ease of modification. It is common to find sketches, tables of results, explanations, equations, theory, summaries of material read, full references, and so on in a logbook. In addition you may wish to keep a series of documents on your computer as a log which you continually update. If you do this please paste paper copies into your logbook or portfolio. Discuss this with your supervisor and if s/he agrees send him/her an update discussion document by email before each of your meetings.

The main purpose of the logbook or portfolio is to act as a memory aid and to record your evolving thoughts, sources of information, actions, design ideas, implementations, results and evaluations. It is very difficult to remember exactly what you did and why three months after the event, your logbook or portfolio should record the full detail. When writing a report, it will be comforting to note that all the information needed will come from just one source - your logbook.

As indicated earlier, your logbook must record the outcomes of your discussions with your supervisors as they progress and in particular any actions agreed at the end of the meeting. Your supervisor will expect to sign and date your logbook at the end of each meeting to indicate his approval (or otherwise!) of the progress you are making and the agreed actions. Your logbook or portfolios will be assessed during the year and collected at the end of the project for final assessment with your project report.

7. Report writing - general requirements

Layout

All reports must be presented in word-processed form. The paper should be white, A4 size, with a minimum weight of 71 gm/m² and a maximum weight of 103 gm/m². Double sided printing can be used, to save paper. Single sided printing can be directed to University provided printers and paid for at the appropriate rate, if you do not have your own printer. The University and the Department also provide PC-based word processing facilities that should be used, if you do not have a PC.

Reports should be presented using 11-point Times New Roman font with 1.5 line-spacing and may be copied single or double-sided. Margins should be at least 2 cm, on all four sides. The pages of text, including inserted equations and diagrams, must be numbered consecutively at the bottom centre of each page.

Cover page

Please ensure that your name, the project title, and your supervisor's name are clearly typed on the report front cover.

8. Initial Report

The aim of the initial report is to ensure that you and your supervisor agree on what the project is about, and to check that you have a clear idea of how you are going to tackle it. It should be no more than five pages of text. The report should include:

- A cover page, complete with your name, the project title, and your supervisor's name.
- The project goals. You should describe in brief the methodology you will adopt, the platform (software/hardware) you will use, and the basic system functionality and design. It is important that you describe the goals in a manner that gives confidence to their being achieved.
- An outline of the background reading you have carried out. You need to demonstrate that you have read and understood a range of background literature from a range of sources including to a great extent peer reviewed articles. There should be appropriate referencing (IEEE or other professional standard). It is advisable for the student to use an electronic referencing system such as [EndNote](#) which is available on University computers.
- Project Planning. You are advised to build on your use of Microsoft Project Manager within CE201, CE241, or CE261 from your second year. The initial report must include a Gantt chart indicating the key milestones for your project.

Please refer to the document titled, “Initial Report Marking 2010-11”, to understand how you can optimise your grades.

9. Interim Report

The interim report is intended to provide a snapshot of project progress towards the end of the autumn term. It should be no more than 10 pages long. The report should include:

- Cover page, complete with your name, the project title, and your supervisor's name
- (Possibly revised) goals of the project
- (Possibly revised) Gantt chart
- A review of the background reading carried out
- Progress to date indicating design approach and methodology being adopted
- Objectives already achieved
- Plans for next term

Please refer to the document titled, “Interim Report Marking 2010-11”, to understand how you can optimise your grades.

10. Project Posters

Project posters are designed by students using a template which will be provided on the online course repository. Students should get approval for their poster from their supervisor before submitting it electronically via the online submission server. The poster will be marked by your supervisor and your second assessor during the project open day.

Please refer to the document titled, “Poster Marking 2010-11”, to understand how you can optimise your grades.

11. Project Open Day

There is a project demonstration Open-Day on Monday of week 25, from 2.00 pm to 5.00 pm. **All** projects are demonstrated to staff, students and visitors to the department. Your normal laboratory location may be used or you may be asked to demonstrate in the Networks Building Foyer or one of the computer labs. To aid your demonstration you will be required to prepare a poster indicating the aims and objectives of your project, the approach you have used, and an assessment of what you have achieved. The poster should help visitors to understand what your project is about. A member of the technical team will advise you and provide a template for this activity. Make sure you talk to your supervisor and agree on text and layout. Make sure it is spell checked please.

12. Final Report

This report gives a full account of your project work. It will be read by your supervisor and second examiner, and will form the basis for the subsequent oral examination. It is important that you discuss the format and structure of this report with your supervisor before writing it.

You should make a copy of this report for yourself, as well as submitting two hard copies and one electronic copy. Here are some guidelines for the report (see also section 7).

Length

The maximum text length is 10,000 words. Diagrams, equations, pictures, and references are not included in this word count. In addition you are allowed appendices, but these should only be used if they add something useful to the report.

If your project is software oriented and has a lot of code, you are advised to put the code printout into a separate document or include a CD. The final report can then give an overview of the software, and summarise its performance.

In general the material of a report should be organised as follows:

Title page (1 page)

Page stating that work of others has been acknowledged (1 page)

Abstract/Summary (a page on its own) (1 page)

Table of contents (1 page)

List of symbols (optional) (1 page)

Main text (in as many chapters as are necessary) (30 to 40 pages)

Discussions and conclusions, including consideration of the use of the Gantt chart for project planning (1-3 pages)

Acknowledgements (1 page)

References
Appendices

Title

This should indicate the main subject of the report. It should be no more than seven or eight words long.

Abstract / Summary

The report should begin with an abstract or summary of what the report, not exceeding 200 words. It should contain sufficient information for the reader to understand what the project is about, what work has been carried out and what the final outcome of the work was. The summary page should not be numbered, but all other pages are numbered consecutively.

Table of contents

The report should be subdivided into relevant sections. Each should be given a meaningful heading or subheading, and they should follow a numbering scheme as given below.

List of symbols

This list defines the main symbols used in the report, especially acronyms and unusual meanings. The SI unit system is standard and should not be listed here.

Main Text

It should begin with setting the background area for the project (this will probably include references to source materials.) What problem is being solved? Why is this problem important? After setting the scene, there should be a statement of project aims and objectives, and followed with a technical specification. What are the key parameters? What variability can they have? Once the reader understands the specification, there should be sufficient introductory matter to enable the report to be readily understood without the need to refer back to other publications. Brief definitions of new or uncommon technical terms should be given here. It is important to discuss the design approach adopted in order to realise hardware and/or software solutions to meet the specification.

Related topics should be kept close together, and the relationships should be clearly indicated. Explanations should be given in terms of what has already been revealed rather than in terms of what is to follow. References should be given as close to the referred material as possible. You should précis important material and avoid long quotations, a reference to the original work being given instead.

The main text should include no more mathematics than is absolutely essential. Extended mathematical treatment, if necessary, may be added as an appendix at the end of the report. A detailed explanation of, for example, a standard circuit configuration or design technique or a lengthy digression, if it must be included, should also be put in an appendix. Parenthetical remarks and footnotes which also distract the reader's attention from the main theme should be brief and few.

Discussion/Conclusions

In this section you should deduce general results about the project. For example, 'The design process X, using input data Y, predicted the performance Z. Experiments gave the actual performance as P, which closely agrees with Z. Therefore, the design was successful.'

Any unsuccessful or mysterious results should also be reported, and commented on. The discussion can also suggest more work to be done, perhaps by a student next year. Finally, the conclusions should summarise the results and give your experience with using a Gantt chart. Was it helpful? Were you able to keep to schedule? Where did the biggest discrepancies occur?

Acknowledgements

If material has been obtained from sources outside the University, for example from liaison with industry, the student may wish to make an acknowledgement. Acknowledgement to the supervisor is not required, but assistance from postgraduate or other undergraduates should be fully acknowledged.

References

These should be numbered and listed in a special section entitled 'References', or if exhaustive, 'Bibliography', and indicated in the text by means of superior numerals ('Indices').

- 1 Badie, K., Shimura., Machine recognition of Roman cursive scripts. Proc. 6th Int. Conf. on Pattern Recognition, Munich 19-22 Oct. 1982. pp. 28-30.
- 2 Newman, W.M., Sproull, R.F., Principles of Interactive Computer Graphics (2nd Edition), McGraw Hill, ISBN 0-07-066455-2, 1981, pp. 45-46.

With the exception of the IEE and IEEE publications, the titles of periodicals should not be abbreviated. The references must be quoted with sufficient detail to enable a reader to go to the library and locate the article or request it through inter-library loan. A complete and accurate list of references serves a double purpose: (i) it enables the student to acknowledge his/her sources of information, and (ii) it assists the reader to locate those sources and other relevant literature.

Page numbers should be given in references, to help the reader. Imagine the work involved if the reference is to a 450 page textbook, without any page numbers listed. It could take the reader a considerable time to track down an elusive equation, or diagram.

You are recommended to use [Endnote](#) for your referencing.

Tables, graphs and equations

Results can often be displayed more effectively by means of graphs than by tabulation. But if a graph is say a straight line, the graph can be replaced by a simple statement, or equation. Tables, graphs and equations should be integrated into the text, rather than appearing on separate pages. All tables and diagrams should have brief meaningful headings and should be numbered consecutively throughout both the main text and appendices.

The report should be bound. Please ensure that the project title, your name, and that of your supervisor are included on the cover of the report. It is sensible to prepare a third copy for yourself, as this will be useful to you in the oral examination.

Please refer to the document titled, "Formal Report Marking 2010-11", to understand how you can optimise your grades.

13. Presentation, Demonstration and Oral Examination

During week 31/32 each student will give a formal presentation outlining their objectives and methodology and a demonstration of their achievements. This will be followed by an oral examination with the supervisor and second examiner who will ask detailed questions in order to verify your understanding and to ascertain the level of achievement. It is important that you have a copy of your report with you during this examination.

Individual presentations, demonstrations and oral examinations should typically last between 40 – 55 minutes. Afterwards the examiners are not allowed to announce to you the project mark, or even to indicate whether you have passed or failed. Please do not ask them to do this.

Please refer to the document titled, “Presentation, Demonstration and Oral Examination Marking 2010-11”, to understand how you can optimise your grades.

14. Project Assessment

The elements of the CE301 Project are assessed by the Project Supervisor and the Second Examiner as shown in the table below.

	Project Supervisor: Max Marks	Second Examiner Max Marks
Week 3: Initial Report:	5	5
Week 9: Interim Report:	10	10
Week 23: Poster	5	5
Week 30: Logbook	15	15
Week 30: Formal Report	50	50
Week 31/32: Presentation/ Practical Demonstration/Oral	15	15

15. Plagiarism Advice

It is an academic offence to use the work of others without acknowledgement, where a judgement is made that this has been the result of serious negligence or of intention to deceive. You must acknowledge any assistance received or fully reference the use of the work of others. See also the section on plagiarism in the *Undergraduate Student Handbook* under the section on Academic Offences and also use the link below about ‘Authorship and Plagiarism’:

<http://www.essex.ac.uk/plagiarism>

Remember that you are required to submit your report electronically and it will be passed through the “TurnitinUK” plagiarism checking system which will identify copied sections. If you do copy anything (including pictures/jpegs) then be sure to insert it as a quotation or at least acknowledge its source using the appropriate referencing technique. Do remember that quotations should only be used in a technical report in exceptional circumstances.

Here are some examples of incorrect and correct usage of reference material. This is the original passage, which I have taken directly from this web site (<http://nms.lcs.mit.edu/papers/ron-sosp2001.html>) Assume the source is going to be Reference 1 in the report.

A Resilient Overlay Network (RON) is an architecture that allows distributed Internet applications to detect and recover from path outages and periods of degraded performance within several seconds, improving over today's wide-area routing protocols that take at least several minutes to recover. A RON is an application-layer overlay on top of the existing Internet routing substrate.

If you use this in your report in the following two ways it would be cheating;

1. A Resilient Overlay Network (RON) is an architecture that allows distributed Internet applications to detect and recover from path outages and periods of degraded performance within several seconds, improving over today's wide-area routing protocols that take at least several minutes to recover. A RON is an application-layer overlay on top of the existing Internet routing substrate.
2. A Resilient Overlay Network (RON) is an architecture that allows distributed Internet applications to detect and recover from path outages and periods of degraded performance within several seconds, improving over today's wide-area routing protocols that take at least several minutes to recover. A RON is an application-layer overlay on top of the existing Internet routing substrate. [1]

If you use it in the following way it would be discarded from the assessment;

3. "A Resilient Overlay Network (RON) is an architecture that allows distributed Internet applications to detect and recover from path outages and periods of degraded performance within several seconds, improving over today's wide-area routing protocols that take at least several minutes to recover. A RON is an application-layer overlay on top of the existing Internet routing substrate. The RON nodes monitor the functioning and quality of the Internet paths among themselves, and use this information to decide whether to route packets directly over the Internet or by way of other RON nodes, optimizing application-specific routing metrics." [1]

If you use it as follows it would be used in the assessment;

4. Anderson et al [1] state the following "A Resilient Overlay Network (RON) is an architecture that allows distributed Internet applications to detect and recover from path outages and periods of degraded performance within several seconds, improving over today's wide-area routing protocols that take at least several minutes to recover. A RON is an application-layer overlay on top of the existing Internet routing substrate." From this we can see that RONS have the ability to detect and solve problems. They are easy to implement as it can be overlaid on existing networks.

The most acceptable use would be the following;

5. Resilient Overlay Networks (RONS) are architectures with extremely useful features. They can detect and recover situations that occur in networks. For example they can recover path outages. They can also deal with periods of degraded performance. These detections and recoveries can be achieved in seconds. This is a significant improvement on current routing protocols in which recoveries can take minutes. They are easy to implement as it can be overlaid on existing networks.

16. Final Year Prizes

A variety of prizes are awarded to final year students, which are listed below:

The Computer Science and Electronic Engineering Prize, worth £250, is awarded to the final year student who achieves the highest degree mark.

The Institute of Engineering and Technology Prize is awarded to the final year BEng student who achieves the highest degree mark. The prize-winner will receive two years' free membership.

The Project Presentation Prize worth £100 is awarded for the best presentation on a final year project at the Project Presentation Day.

The Institute of Electrical and Electronics Engineers UK&RI Communications Chapter Prize, worth £100, is awarded to the final year BEng student who achieves the highest project mark. Please note that this prize is awarded on the understanding that the student uses part of this £100 to become a member of the IEEE and join the Communications Chapter.

The Telecom Technologies Prize, donated by Telecom Technologies Limited, is awarded by the Board of Examiners to the undergraduate student achieving the highest degree mark on the BEng Telecommunication Engineering degree. The value of the prize is £150.

The TeamCast Prize, donated by TeamCast is awarded by the Board of Examiners to the Final Year student achieving the highest degree mark on the BEng Telecommunication Engineering degree. The value of the prize is £150.

A number of other national prizes are available and details will be emailed to the students when they are received. If you think your project is suitable and you would like to enter any of these competitions please discuss it with your supervisor and the Project Coordinator. We have had some success in such competitions in the past and there is usually a significant financial reward as well as the prestige associated with a national competition.