Faculty of Information & Communication Technology

Computing Science Final Year Project

Contents

1. Introduction

This document is intended to provide general guidelines to the students following the **Computing Science** undergraduate degree programme.

This document contains and refers to material:

1. Published on the ICT Website of the University of Malta (http://www.um.edu.mt/ict,).

2. The document "Final Year Project Guidelines" published by the Faculty of ICT.

Students are also encouraged to read the University's official regulations on FYPs.

Study Unit Outcomes

The main components of this study unit comprise the following:

1. A written dissertation in the form of a report detailing the context, effort, reasoning and conclusions of the student's academic endeavor. The specific qualities expected in this dissertation are summarized below:

   Work:

   - Description of the problem: Highlight the problem and the need for a solution;
   - Research methods: to use sound scientific methods of research;
   - Problem-solving skills: to solve problems in a structured and rational manner;
   - Achievement: to produce complete and correctly functioning artefacts.

   Management:

   - to work on one's own initiative, subject to a minimum of one (1) communication per month between student and supervisor;
   - It is the student's responsibility to ensure that communication will take place. Supervisors will 'raise a flag' when they notice that students are not meeting them;
   - to keep to deadlines;
   - to adequately plan project work;
   - to coordinate with third parties (including artifacts developed by such).

   Communications Skills:

   - to produce adequate user documentation relating to the artifact produced;
   - to identify and explain the relevant concepts clearly;
   - to report comprehensively on the work produced.

   The maximum length for the dissertation write-up is 35 pages or 15,000 words (whichever comes first) following the template provided in the "FYP in Computing Science" website. The limit does not include front material, and appendices. Exceeding the limit of 35 pages or 15,000 words will result in automatic failure of the study unit and a 0 (F) will be assigned.

   Requests for changes in the title of the dissertation must reach the Computer Science secretary office, one month before submission to allow for processing.

2. A Review Report, in the form of a 6-page scientific paper, whose aim is to demonstrate the skills of the student in condensing the salient and relevant parts of his/her effort in the form of a review, highlighting the road-map of the scientific method that was adopted in tackling the issues that were exposed through the student's background research, (including the background research itself), work carried out, results obtained, and conclusions drawn. This document will be sent to the external examiner to evaluate the student's performance.

3. A presentation highlighting the effective and prominent elements of the student's overall effort. This will be composed of a 5-minute presentation, usually aided by a poster, and not more than a 25-minute question time.

This study unit also requires the production of:

1. A 5-page maximum progress report, which describes the work done and provides a more detailed proposal of the future work. The submission of this report is typically in the month of December and the deadline is announced of the "FYP in Computing Science" website. Students must submit a soft copy on VLE and one (1) hard copy of this report.

2. A suitable poster displaying the highlights of the student's project is also required as part of the deliverables of this study unit (Further details about the format of this poster can be found online on www.um.edu.mt/ict). Students are obliged to submit the poster in terms of Regulation 79 of the General Regulations for University Undergraduate Awards, 2004. Students who fail to submit the poster may not be permitted to graduate.

3. A 1-page abstract for the ICT FYP Exhibition.

Resubmission

If the student fails to pass, and with the recommendations of the external examiner and the panel of supervision assigned, students will be allowed to re-submit their dissertation and redo their presentation & oral examination. In such case, the maximum grade that may be awarded shall be grade D.

2. Components of an FYP

This section lists the items that a student is expected to deliver during the course of an FYP. This list also includes components that do not necessarily contribute to the final grading of the FYP.

- Progress report
- First draft of the dissertation to the supervisor
- Four spiral-bound copies of the dissertation for examination
- Review paper
- 1-page abstract for ICT FYP Exhibition
- Poster
- Three hard-bound copies of the dissertation.

These deliverables are highlighted and placed on a timeline in the next section.

3. Important Milestones

Period (Approximate*)	Milestone	Notes
Previous Year		
April	Publishing of FYP Titles and Areas of interest.	Titles and areas of interest will be made available to students.
May	Student submits title.	After consultation with the potential supervisor, students will submit the title of their preferred FYP or in case of a student proposed FYP an enumerated list in order of preference.
May	Title accepted or rejected.	Official notification from departmental offices. The complete list of allocated titles will be made available online.
Beginning of 'FYP Year'		
December, before recess.	Submission of **progress report**.	
April, Mid	Final chance to submit requests for changes in Final Year Project titles.	
May, Beginning	Submission of **first draft** to supervisor for review.	
May, Mid	Feedback by supervisor on first draft.	
May, End	Students submit **spiral bound copies** of their report.	
June	Submission of **review report**.	
June	Submission of **1-page abstract** for ICT Final Year Student Projects Exhibition.	
June	Submission of **poster**.	
June	Presentations and demonstrations.	
July	Submission of **hard bound copies** of report.	

- exact dates will be published yearly in the "FYP in Computing Science" website.

4. The Progress Report

4.1 Purpose

A Computing Science Final Year Project requires the production of a progress report. Students are obliged to produce and submit a 5-page report. Further work on this study unit can only proceed after due approval of this report.

The main aims of the progress report are:

- To establish a checkpoint between supervisor and student. The problem, methodology and evaluation plan should have been defined by this point.
- Establish a plan of action milestones and as such to ascertain whether the timeline proposed by the student is realistic.
- An opportunity for the supervisor(s) and examiners to give feedback on the plan of action.

4.2 Format and Expected Content

The Progress Report should mainly consist of a description about work related to the chosen area (literature review) and an expanded proposal of the Final Year Project. In addition the intention of how to achieve the objective, as well as a milestone schedule (e.g. start of coding, system design, hardware design and implementation, system testing and verification, start of dissertation writing etc.), should be included.

The format of a progress report will consist of:

- A short abstract, circa 50 words.
- A description of the FYP:
    - An introduction to the area.
    - Motivation for the project.
    - A defense of why the problem is non-trivial.
    - Background research and literature review.
    - Aims and objectives.
    - Methods and techniques used or planned.
    - The evaluation strategy and technique that is being proposed.
    - A breakdown and description of the deliverables, including the artifact, in the FYP.

The report should be 5 pages long.

5. The FYP Report

See the table "Primary FYP Types and Emphasis" at the end of this document.

5.1   Proposed Structure

In general, the structure of an FYP report will consist of:

1. Title page.
2. Declaration (plagiarism).
3. Abstract.
4. Acknowledgements.
5. Table of contents.
6. Other tables and lists.
7. Table of abbreviations (optional).
8. Main content:
   a. Introduction.
   b. Background and literature review.
   c. Specification and design (optional, depends on FYP).
   d. Implementation (optional, depends on FYP).
   e. Evaluation (and testing).
   f. Conclusions and Future Work.
9. Glossary (options).
10. Appendices:
    a. Including user guides (if necessary), contents of the CD (or other digital media), questionnaires (if applicable), complete data collected or samples.
11. Bibliography and References.

5.2   The Introduction Chapter

- Introduce the area and the FYP without assuming that the reader has any special knowledge in the area.
- The aims and goals of the project.
- Any non-aims of the project (e.g. in a purely theoretical project, the development of an artifact would not necessarily be an aim).
- The approach used.
- Any assumptions.
- A high level description of the project.

5.3   Background and Literature Review

The purpose of the background section is to provide the typical reader with information that they cannot be expected to know but which they will need in order to fully understand and appreciate the rest of the project.

This section may describe such things as:
- the wider context of the project,
- the anticipated benefits of the system,
- the likely users of the system,
- any theory associated with the project,
- the software/hardware development method(s) used,
- any special diagramming conventions used,
- existing software (or hardware) that is relevant to the system,
- Etc…

Note on the "Typical Reader": in the case of an FYP the potential readers would usually be:

- The supervisor(s).
- An external examiner.
- Other ICT students.

Since projects will likely include different kinds of theory, programming language choices, compilers, software/hardware components, APIs, development boards, one cannot always assume that the reader will be familiar with the details of all of them. Certain assumptions *may* be made on the background of the potential reader (e.g. it would be fair to assume that the audience will be familiar with general programming concepts, object oriented principles, and system design). However, when more esoteric choices are made (e.g. dependency on a proprietary image processing library or simulator), the author will want to elaborate and use references to guide the reader.

The literature review component of the report should include:

- An extensive study in the area of interested, highlighting the strengths and weaknesses of existing methods.
- A review of the state-of-the-art published material in the area.
- A summarization of the published material in the area.
- A critical analysis of exiting material and methods.
- An explanation showing why the literature chosen to review is relevant to the FYP.

5.4   Specification and Design

The purpose of this section is to give the reader a clear picture of the system/artifact/project/work that has been created in the FYP and why it has been created in the way chosen.

Details:

- Fine details, specifically details of the system (software or hardware) should be left out. Also, any complete rigorous specification is better relegated to an appendix.
- Using diagrams (including but not limited to flowcharts and system level block diagrams) is strongly recommended.
- Any design choices have to be justified (e.g. by discussing the implications of different design choices and then giving reasons for making the choices made).
- The design of the project will almost certainly have evolved during development. Focus should be made on the project as it is in its final state but often there are good reasons for describing intermediate states too (e.g. to discuss details of the design method used).

5.5   Implementation

The Implementation section is similar to the Specification and Design section in that it describes the system but it does so at a finer level of detail, generally down to the code/theorem/algorithm/ … level. It can also describe any problems that may have arisen during implementation.

- In case of a software development describing of all the code in the system should be avoided as well as large "pieces" of code. Complete source code listings should be put on the accompanying digital media (e.g. CD or DVD). In case of hardware the system should be divided into sub systems or circuits that may be easily described and analysed.
- One must be especially critical to the operation of the system.
- Mentioning unforeseen problems encountered during implementation.

- Explanation of a seemingly disproportionate amount of project time taken up in dealing with such problems. The implementation section gives you the opportunity to show where that time has gone.

5.6   Testing and / or Evaluation

The testing and / or evaluation component of an FYP is critical.

- One has to make sure and explain why all tests used to evaluate the system are relevant, using evidence from the literature about similar systems, and justifying any deviations from standard approaches;
- Demonstration that system works as intended (or not, as the case may be);
- Include comprehensible summaries of the results of all critical tests that have been made;
- If the student has not had time to carry out fully rigorous tests (in some cases, the student may not have had time to produce a testable system) suggestions as to what tests would be and why they are relevant is important;
- The student must also critically evaluate the system in the light of these tests results, describing its strengths and weaknesses;
- Ideas for improving it can be carried over into the Future Work section;
- Comparison of practical with theoretical results and their interpretation.

5.7   Conclusions and Future Work

The Conclusions section should be a summary of the project and a restatement of its main results, i.e. what has been learnt and what it has achieved. An effective set of conclusions should not introduce new material. Instead it should draw out, summarise, combine and reiterate the main points that have been made in the body of the dissertation and present opinions based on them.

Whether by the end of the project all the original aims and objectives have been completed or not, there is always scope for future work. Also the ideas will have grown during the course of the project beyond what the student could hope to do in the time available. The Future Work section is for expressing these unrealised ideas. It is a way of recording 'I have thought about this'. A good Future Work section should provide a starting point for someone else to continue the work which has been done.

This section marks the end of the dissertation proper.

5.8   Supporting Structures

5.8.1 The Title Page

The title page should include:
- The title of the dissertation,
- The name of the author,
- The name of the supervisor(s),
- The name of the department and faculty,
- The date of the completion of the dissertation,
- The qualification for which the dissertation is a part.

5.8.2 The Abstract

This is a summary of the dissertation. It must be less than 300 words long. It should give enough information to allow a potential reader to decide whether or not the whole dissertation will be of interest to them. It should briefly describe the main features of the dissertation including the aims

and conclusions, brief overview of the results obtained and a critical statement of the success of the approach. It should be both self-contained and self-explanatory, and it should refer to anything not mentioned in the rest of the dissertation.

5.8.3 Acknowledgements

This section should be used to record any debt for the use of facilities or help from particular sources. You should mention any organisations that have helped fund the project. Also, for placement students, it would be diplomatic to include the name of the supervisor in the host organisation where the student was placed and any of his or her colleagues who helped you.

5.8.4 Appendices

Appendices are repositories for material which the student wishes to include in the dissertation but which would seriously obstruct the flow of ideas put anywhere in the main body. Printouts of the final version of any code should be avoided – the code must be available digitally on accompanying media.

Examples of items that could go in appendices are:
- A glossary of terms.
- Fundamental and basic theory.
- Detailed notes on the programming language chosen or hardware platform used (e.g. development boards).
- A user's guide.

Important notes:

Students are to submit 3 spiral-bound copies of the FYP dissertation for examination. Assessment will take place on the basis of the contents of the spiral-bound copies and any accompanying material. Any final artifacts, documents, source code, an electronic version of the report itself, etc… should be included in a CD with every spiral-bound copy submitted.

After examination, the examiners might request changes in the dissertation. Following the revision of the document according to the requests, students are to submit 2 hard-bound copies of their FYP dissertation to the Department's office. Additional copies are to be submitted in cases when there is co-supervision – one additional copy per co-supervisor.

5.9   Formatting and Layout

The dissertation must be written using LaTex. A template with the required formatting is provided on the 'FYP in Computing Science' website. Note that these settings cannot be changed.

Maximum length: The maximum length for the dissertation write-up is 35 pages or 15,000 words, whichever comes first.

5.10 Sample Title Page

\<Final Year Project Title\>

\<Author's Full Name\>

L-Università ta' Malta

\<Department Name\>

University of Malta

\<Month and Year\>

Submitted in partial fulfillment of the requirements for the degree of B.Sc. (Hons.)

6. The Review Paper

6.1   Purpose

The aim of the Review Report, in the form of a 6-page scientific paper, is to demonstrate the skills of the student in condensing the salient and relevant parts of his/her effort in the form of a review, highlighting the road-map of the scientific method that was adopted in tackling the issues that were exposed through the student's background research, (including the background research itself), work carried out, results obtained, and conclusions drawn. This serves as a summary of the student's work and to guide the assessment process of the external examiner.

6.2   Format and Expected Content

The review paper must be written in scientific paper format and should be written in a style similar to that of a professional academic workshop or conference proceedings. The following structure is suggested:

- Abstract.
- Introduction and Background.
- Aims and Objectives.
- Design.
- Implementation.
- Results and Evaluation.
- Conclusions and future work.
- Bibliography.

Important notes:

One copy of the Review Report is required and should be submitted to the Department's office.

7. Abstract for FYP Brochure

7.1 Purpose

Students are required to submit an abstract of their FYP for inclusion in the yearly FYP brochure. The FYP brochure is handed out during the annual FYP exhibitions but is also used by the Faculty as a showcase of its work at conferences and in meetings with external stakeholders.

7.2 Format and Expected Content

- The abstract should consist of circa 250 words outlining the general purpose, methods and achievements of the FYP.
- If possible, one relevant, high-resolution image must be submitted to make the abstract more attractive.

8. The Presentation

8.1   Purpose

The main purpose of the presentation is to demonstrate the student's ability to summarise and communicate their work and achievements.

Students will be graded based on the quality of the presentation, their communication skills, adherence to the time requirements of the presentation and demonstrating that they truly understand the FYP area.

8.2   Format and Expected Content

Each project will be allocated 30 minutes of oral examination time, which will be subdivided as follows:

1. The first part will be allocated to the actual FYP presentation. This is a 5-minute presentation normally using a poster presentation.
2. The second part will consist of questions from the examiner(s), who are usually members of staff, other members of staff, as well as any other third person attending the session. This part can take a maximum of 25 minutes.

9. The Poster

9.1   Purpose

The Poster is intended to present the project at the Final Year Project Exhibition. The emphasis should be on a visual style of communication with attention given to the, generally, short time span available to the reader.

Although the poster carries no marks, <u>students are obliged to submit the poster in terms of Regulation 79 of the General Regulations for University Undergraduate Awards, 2004. Students who fail to submit the poster may not be permitted to graduate</u>.

9.2   Format and Expected Content

- The poster should be presented printed on an A1 gloss 190GSM photo paper.
- It should be in portrait.
- It should be accompanied with two poster hangers (top and bottom).

Posters are usually expected to be in colour and use a combination of graphics, captions, diagrams and short text notes to describe the FYP as concisely, yet clearly, as possible.

The title of the project, the name of the student as well as that of the supervisor(s) should be clearly visible on the poster.

Note:

- *The posters will be displayed during the ICT exhibition. A requirement sheet will be made available to students where they will indicate any resources that they might require to exhibit their project.*

10. The Hard Bound Copies

Students are required to submit bound copies of their FYP report:

- One for each supervisor (students who are co-supervised must submit an additional copy of their report for the co-supervisor),
- The Departmental archives.

Associated media must to be included with the supervisor's copies ONLY.

Hard Bound Copies covers should be black with gold writing (see examples below).

Miscellaneous

1. The FYP report should be submitted together with a digital medium which should contain:
    a. A soft copy of the report in PS or PDF format.
    b. Any source code, and system diagrams related to any artifact that has been developed.
    c. Executable versions of the artifact (if any).
2. Acceptable digital media are 'USB pen drives' or Compact Discs.
3. Students should submit a softcopy of the dissertation on the VLE for plagiarism checking.
4. With the exception of excerpts to illustrate algorithms, design and capabilities, full source code should not be printed in the report.

11. Primary FYP Types and Emphasis

Primary Focus	Characteristics	Challenges	FYP Emphasis	Examples
Implementation Centric	• Complex algorithms, not well understood or require refinement. • Trial and error implementation	• Understanding the solution, difficulties, subtleties and explaining them clearly.	• Implementation chapter.	• Implementation efficiency. • Non-blocking data structures.
Design Centric	• Design "elegance". • Apparently trivial but complex underneath. • Based on existing work.	• Understanding pitfalls and shortcomings of existing solutions. • Simplification, improvement, analysing and formalising.	• Design and background.	• Refactoring a library. • Formalising an existing solution. • Designing a communication protocol.
Proof of Concept	• Novelty. • Unclear aims when starting off. • First attempt at solving a problem. • Exploratory.	• Defining problems. • Identifying what does not work. • Partial solutions suffice.	• Literature review to defend novelty. • Problem specification.	• Merging two novel technologies. • Use of an algorithm to solve some application (the algorithm need not be novel, but the application of the algorithm to that domain needs to be).
Application/Client Centric	• Clear development path (although might need refinement after initial stages). • Extensive amount of work. • Involves a human element (a client). • Evolving Specifications	• Complete solutions. • Polished and documented development. • Managing specs in flux	• Selection of development process. • Explaining decisions. • Documenting development process so that it can be audited.	• Project-management systems/ extensions. • Client-driven projects (ones that involve collaboration with non-technical staff)