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Applied Technology Handbook
Semester 1 and 2

Honours B.Sc. in Information Technology (Stage 4 - Award)

July 2018

Contents

Appendices

1. Introduction

1.1 Handbook Purpose

The handbook provides clear aims, objectives and procedures for the Applied Technology Project for the Honors B.Sc. in Information Technology at the CCT College Dublin.

This handbook covers the following:

- Project learning outcomes
- Assessment requirements and expected schedule of project activity
- Guidelines on project deliverables
- Guidelines on report style, referencing style and plagiarism

1.2 Introduction to the Individual project concept

As a requirement for completion of the Level 8 B.Sc. in Information Technology individuals are required complete a substantial Individual project spanning both semesters.

The project aims to:

- Provide learners with an opportunity to work as an individual and show initiative to complete a major project from feasibility, design, development and initiation to completion.
- Provide learners with an opportunity to focus on specific chosen areas within the programme and to integrate and apply their knowledge and skills.
- Motivate learners in their continued intellectual, personal and professional development in terms of communication, confidence-building and self-esteem.
- Provide awareness for the need of good, clear project documentation backed up with the ability for good planning and scheduling skills.
- Create awareness of the legal and ethical aspects of design and development while being mindful of diversity and multiculturalism.

1.3 Supervisor's Role

The project is a set of activities that an individual takes full responsibility and accountability for. While it is important that the Individual co-ordinate their own meetings it's also a project requirement that the Individual meets with an assigned Project Supervisor on a scheduled basis.

The specific role of the Project Supervisor is as follows:

- Facilitate on-site progress meetings as required.
- Provide general feedback about quality of work to date and overall progress.
- Provide advice about project activities, methods and evaluation/monitoring issues.
- Make suggestions about useful sources of information, literature, and the technical resources such as international standards and organisations relevant to the project.
- Assess and mark project deliverables

Each learner will be assigned an individual supervisor but other supervisors will be available for consultation depending on the specific technical requirement. In some cases, a secondary supervisor may be assigned to an individual learner depending on the nature of the project requirements. Project supervisors will be selected from the available pool of IT faculty at CCT. Guidance can be sought from other sources and this process can be discussed with the principle project supervisor. As this is a heavily credited project module, substantial autonomy is expected from the individual learner, therefore, minimum supervision time is expected over the course of both semesters.

1.4   Mandatory Applied Technology Project Session

A mandatory Applied Technology Project Session class will be allocated on your academic timetable. This weekly session will be hosted by a suitably technically qualified member of faculty who will provide general guidance and support to individual projects. This is an opportunity for the class to meet weekly, to share ideas and present work to date, but also to raise queries they have as they progress through the project over both semesters.

2. Assessment Breakdown and Timeline

2.1 Overview of project assessment

Assessment will be based on the set of deliverables outlined below. The Individual work will constitute 100% of the overall marks which is broken down into a number of key deliverables which can be set as milestones throughout each semester. This distribution of marks ensures that individuals can assess their progress and receive ongoing feedback and evaluation on their performance.

Assessment Components

Semester 1 Contribution

Deliverables	Mark
Deliverable 1: Project Proposal	10
Deliverable 2: Attendance and engagement at scheduled supervision sessions	5
Deliverable 3: Completed Reflective Learning Journal – Semester 1	5
TOTAL	**20**

Semester 2 Contribution

Deliverables	Mark
Deliverable 4: Applied Technology Project Report	20
Deliverable 5: Attendance and engagement at scheduled supervision sessions	5
Deliverable 6: Completed Reflective Learning Journal – Semester 2	10
Deliverable 7: Quality of academic research and referencing	10
Deliverable 8: Artefact demonstration (concept, design, build, implementation)*	15
Deliverable 9: Quality and functionality of artefact build*	25
TOTAL	**100**

*To ensure fairness and consistency blind marking will take place for these components

2.2 Project selection

Learners can choose projects based on their own key skill areas and interests related to information technology and computer science. It is recommended that learners apply their existing knowledge and skills to projects and apply caution for attempting to acquire new critical skill areas for the project to be successful. The learner will create a short project proposal which will be presented to the supervisors, and upon agreement of the proposal, the learner can commence the project based on mutually agreed milestones and deliverables.

2.3   Plagiarism

Plagiarism, as already covered in previous modules and seminars, is academic dishonesty. Plagiarism is the presentation by a student as his or her own work of a body of which is wholly or partly the work of another. Therefore learners should never submit as your own, complete or partial essays/reports/computer programs/images etc.   Learners will be severely penalised if found guilty of plagiarism.

Where reference is made/quotations used from others' work, those parts of the work produced by others must be clearly marked and cited where they appear in the main text, and properly referenced at the end of the document. The learner must make sure that he/she acknowledges materials from others through the use of quotation marks, and citations to entries in your list of references.   Your project supervisor can provide further advice on issues with citation and referencing.

2.4   Important Dates and Deadlines

SEMESTER 1	
Week No. (approx.)	Project Activities / Deadlines
1	Issue of Project Handbook & Project Brief Template
2	Weekly Applied Technology Project session (timetabled group session)
3	Weekly Applied Technology Project session (timetabled group session) **Submission of project proposal (concept accept or reject stage)**
4	Weekly Applied Technology Project session (timetabled group session)
5	Weekly Applied Technology Project session (timetabled group session)
6	Weekly Applied Technology Project session (timetabled group session)
7	Weekly Applied Technology Project session (timetabled group session)
8	Weekly Applied Technology Project session (timetabled group session)
9	Weekly Applied Technology Project session (timetabled group session)
10	Weekly Applied Technology Project session (timetabled group session)
11	Weekly Applied Technology Project session (timetabled group session)
12	**DEADLINE: FINAL SUBMISSION** - Submission of **Deliverable 1**: **Project Proposal Brief** - Submission of **Deliverable 3**: **Reflective Journal Part 1**
13	Project conclusion and feedback meeting with supervisor

SEMESTER 2	
Week No. (approx.)	Project Activities / Deadlines
1	Individual feedback analysis, project discussion, review & strategy meeting with supervisor
2	Weekly Applied Technology Project session (timetabled group session)
3	Weekly Applied Technology Project session (timetabled group session)
4	Weekly Applied Technology Project session (timetabled group session)
5	Weekly Applied Technology Project session (timetabled group session)
6	Weekly Applied Technology Project session (timetabled group session)
7	Weekly Applied Technology Project session (timetabled group session)
8	Weekly Applied Technology Project session (timetabled group session)
9	Weekly Applied Technology Project session (timetabled group session)
10	Weekly Applied Technology Project session (timetabled group session)
11	Weekly Applied Technology Project session (timetabled group session)
12	**DEADLINE: FINAL SUBMISSION** - Submission of **Deliverable 4: Applied Technology Project Report** - Submission of **Deliverable 6: Reflective Journal Part 2** - Submission of **Deliverable 8: Artefact Demonstration**
13	Project conclusion and feedback meeting with supervisor

3. Applied Technology Project – Overview

The Applied Technology Project should closely follow the Software Development Life Cycle (SDLC), where learners are expected to fully plan, design, implement, test and document a software system, or similar. This will enable Individuals to develop software systems using a structured process methodology, similar to that of a real-world project.

The skills and knowledge gained from subjects in previous years, such as Systems Analysis and Design, will aid the learners in structuring the project according to a SDLC methodology. The SDLC, and other key knowledge areas, will be covered as part of series of lectures within the first semester of this module. Typically learners in semester 1 focus on the analysis and design of the system, where Individuals will identify how the system should work and what problems need to be addressed in the development of the system. Semester 2 requires Individuals to produce a working prototype of the system with a detailed project report which outlines the implementation, testing and coding of the system. Documentation and prototype will be presented to supervisors in the form of a demonstration where learners will be expected to walk through their systems, their approach and conclusion.

4. Applied Technology Project – Expected deliverables

4.1 Deliverable 1 – Project Proposal

Learners will have an opportunity to produce a short, 2 to 3 page, initial project concept document to outline their problem area and proposed solution, approach and resource analysis. Learners will also make reference to the project handbook and briefly outline how they can achieve the outcomes within the specified time. This document will be fleshed over the semester, with the assistance of the assigned project supervisor, to become the first project deliverable due at the end of the first semester, namely the Project Proposal. Supervisors will be assigned to learners based on the subject area and technical expertise required to successfully mentor a leaner to project completion.

4.2 Deliverable 2 and 5 - Attendance and engagement at scheduled supervision sessions

When an initial project concept idea is accepted the learner will be assigned a project supervisor. The learner is required to meet the supervisor once per week at an agreed time. The supervision session provides the learner an opportunity to go through progress made and to address some key ideas during the development of the project. The supervisor will provide advice, and suggestions, as the project progresses and learners are expected to either build in feedback or justify a change of direction. Supervision sessions take place throughout both semesters.

4.3 Deliverable 3 and 6 - Reflective Learning Journal

Each learner will be responsible for documenting their key learnings each week through a process of reflection. Supervision feedback and action taken can be incorporated into the journal. This action will determine future decisions and considerations while facilitating and strengthening knowledge. A number of lectures will be held during the first semester to facilitate reflective practice and the process of maintaining a reflective journal. Learners will be expected to complete a reflective learning journal for semester 1 and for semester 2.

4.4 Deliverable 4 – Applied Technology Project Report

Each project is different, and the precise form of evidence of progress and development will vary from project to project, and be negotiated with your project supervisor. However, the Individual will need to document a detailed project report to including planning, design and development steps and issues and should represent closely the final artefact build. Please see Section 5 for further details.

4.5 Deliverable 7 – Quality of academic research and referencing

Learners are expected to perform detailed academic research and include this research within their project documentation. Correct citing is required with an accompanying reference list.

4.6 Deliverable 8 – Artefact demonstration (concept, design, build, implementation)

Each learner will have an opportunity to present their finished artefact to their supervisors in the form of a conference style demonstration. The learner will answer questions raised by supervisors

and will be required to defend aspects of the final artefact design, build and functionality.

All demonstrations will be recorded and screencast, giving scope for many desirable qualities (including but not limited to): larger audience, diversity in feedback and feedback mechanisms, ability to record/playback, self-reflection, critical analysis, and learning to learn.

4.7   Deliverable 9 – Quality and functionality of artefact build

Two copies of a working, uncorrupted and virus free Individual project must be submitted as part of the project requirements. The following must be submitted on CD-R or DVD-R.

- A working executable version of the system
- All source code
- Other associated files and data, such as data files, databases, images, audio files

As with all submissions for assessment, ensure the following are clearly stated on each item:

- The learners name and student number
- The date
- The project and module title
- Supervisor's name

The Individual must submit copies of their project report as follows:

- 1x copy soft-bound, black board, gold letters on cover showing same information as title – this copy is for the CCT Library
- 2x copies soft-bound or ring-bound – these copies will be used for marking

5.   The Project Report

5.1   Project report overview

The project report will prove if learners have gone about their project in a reasonable way to solve the problem outlined in the project proposal. The Individual documents their literature review, so a reader can see the previous works that have influenced their point of view, and the Individual documents their system analysis, design, implementation and testing, so that there is evidence about how the individual has followed a systems life cycle process to attempt to solve a problem. The Individual will need to refer to the results of their testing and any user evaluations as evidence to support their project report conclusions about the success of their system as a means of solving the problem they have set out to solve.

Issues to keep in mind when writing the project report is that it is an argument and a story about how the Individual has chosen to solve a particular problem, including:

- Academic story with a document / resource trail:

  o   Citations to entries in list of references
  o   Must present alternatives for important decisions, evaluate each and then argue choices they make
  o   The important thing is that even if someone reading the dissertation doesn't agree with the Individual choices, they can describe them, and understand their arguments

5.2   Project report style

The project report should be written to conform to the CCT Project Report document style. A copy is available in the Academic Office.

The project report should be typewritten and conform to the following guidelines:

- Normal text should be in Times New Roman font (or similar) and be sized 11 point
- Paragraphs should be fully justified and unless immediately after a heading paragraphs should be separated by a blank line
- Headings should be numbered to level 3 but no further
- The footer of each page should have at the left the student names of each Individual member and at the right the page number

5.3   Project report structure

The structure of the project report should conform to the following (although the number of additional chapters and appendices will vary from project to project):

- Title page
- Abstract
- Acknowledgements
- Contents
- Chapters
  o   Chapter 1: Introduction
  o   Chapter 2: System Analysis

- o Chapter 3: System Design
- o Chapter 4: Implementation of system
- o Chapter 5: Testing and evaluation
- o Chapter 6: Conclusions and Further Work
- Appendices
  - o Appendix A: Project Planning
  - o Appendix B: Project Feedback Analysis
  - o Appendix B: Reflective Journal (parts 1 and 2)
  - o Appendix C: Code listings
  - o Appendix D: (other technical or data appendices as required)
- List of References

Chapter 1: Introduction

The first chapter sets the background and motivation for the project. The problem to be solved is stated, with the project aims and a list of specific objectives.

The chapter could include:

- Small number of objectives:
  - o Analyse situation and document with suitable analysis techniques
  - o Design a solution – document the design – evaluate resources to implement the full solution
  - o Implement a working prototype
  - o Evaluate the prototype
  - o Make proposals for what else needs to be done to move from prototype to full working system
  - o Can make clear what the project is not about, e.g. say at start that this is not an HCI project so a functional web interface is sufficient
- General areas of computing that project covers / requires knowledge of
- Brief summary of structure of rest of dissertation
- Short section arguing 'why' this is a good project – outline Individual's skills, interests, strengths – they Individual can describe how the project brings together many of the modules they've listed
- Novel aspects – a real world business or organisation or taking advantage of new technology
- System deliverables, such as:
  - o Working system
  - o User documentation / manual for prototype
  - o Evaluation of system based on functional testing and user acceptance testing
  - o Set of recommendations for further work to take prototype forward to full working system

Chapter 2: System Analysis

The overall aim of this chapter is to answer the questions – exactly what is the application supposed to do? This should be done in sufficient detail so as to form the basis of a contract between the software developers and the clients. It should be a document that consists of:

- Functional Requirements
  - o Detailed description of the functionality of the proposed system. This should be

comprehensive and exact, break up the application into subsystems offering different functionality, and should essentially serve as a checklist that can be referenced at all subsequent stages of the project.
- o Diagrams – use Case diagrams, with text descriptions
- o High-level Class Diagram
- Data Requirements
  - o An overview of the entities and data in the system, and what data needs to be stored about them
  - o Diagrams – an Entity-Relationship Diagram

Chapter 3: System Design

The overall aim of this chapter is to answer the question – how will the application be implemented?

- User Interface Design
  - o This should contain an argument as to how this suggested interface supports each of the use cases specified in the analysis
  - o Diagrams – Screen designs, either pen-and-paper or computer drawn of how the user interface will appear
- Functional Design
  - o Functional design should model both the structure of each software component in the systems, and also how they interact with each other.
  - o Diagrams – detailed class diagram and an Interaction Diagram to show the interaction between objects in the system
- Data Design
  - o Whether to be implemented as a database or some other central data repository, a detailed design of the data storage components should be presented
  - o Diagrams – Normalised database tables

Chapter 4: Implementation of the system

This chapter should detail how the learner implemented a working system based on their design. This should include the technologies used (languages, APIs, frameworks etc.) and how the system was implemented, based on the user and functional requirements identified during the analysis and design phases. This chapter should address any potential problems that could arise in the system and suggested or implemented solutions.

Possible areas for discussion in this chapter are:

- o Architecture considerations - e.g. are there specific functional requirements that will influence the software architecture implementation.
- o Technologies used - operating systems, databases, computer languages, frameworks, API's etc.
- o Implementation of the system - main body of work for the chapter. This will discuss precisely how the system was developed, based on the analysis and design considerations.

- o Problems encountered - any issues that may have arisen during the implementation phase, e.g. the project's cross-platform compatibility between different operating systems.

Chapter 5: Testing and Evaluation

Details of the learner's test plans, test results, user evaluations and discussion of these results in detail and in summary.

Possible entries in this chapter might include:

- Functional correctness
    - o Set of tasks system should be able to perform – part of requirements specification of system and include a focus on efficiency
    - o Set of inputs and correct outputs
    - o Set of 'test scripts'
        - Objective of test / statement of which part of systems is being tested
        - Input data/situation
        - Correct output data / state / behaviour
        - Need to show actual results of test – screen shots
        - Evaluation - if actual matches correct then working
- Usability
    - o List of usability requirements
        - set of tasks user should be able to perform
        - Have a set of tasks for each type of user
        - System Response times
        - Time for user to complete a task
        - Aesthetic
        - Acceptable navigation of site and layout
    - o Set of 'test scripts'
        - Instructions for user
        - Observation / measure time / evaluate success of task
        - Analyse results to come up with usability result
    - o Can also measure qualitative usability aspects with questionnaires / structured interviews etc.
- Commercialisation / marketing
    - o Requirements – registration on web search engines, direct marketing – discuss real commercialisation aspects of project
    - o Evaluation – have set of key words / phrases for targeted websites

Chapter 6: Conclusions

The Individual needs to review the entire project against their problem definition, aims and objectives, and evaluate project success and results. This may also include a section for suggestions for further work, or if there are many than a Further Work chapter may follow the conclusions chapter.

Appendix A: Project Planning

The project planning should be described, and critically evaluated with suggestions for how the project planning could have been improved upon (or not, if the project went well). Indicate how

the project monitoring raised any issues and if the Individual needed to re-plan their project at any point(s).

Appendix B: Reflective Journal

Present evidence of the Individual's reflective processes over the two semesters as an appendix.

Appendix C: Program Listings

This and later appendices provide the technical detail of the Individual's project. They should have only included selected code fragments or algorithm summaries in the main chapters, otherwise the project report can become a monotonous technical manual rather than a story of what they did and why they did it.

6. Project Assessment Policy

The guidelines for assessing the Applied Technology Project are detailed in Appendix A. The guidelines are followed by the Supervisors to determine if learners have successfully planned, followed, tested, implemented and documented their chosen projects. The table below outlines the guideline criteria for marking the entire project.

Applied Technology Project – Semester 1 & 2 *Guideline Marking Criteria*	
• **Evidence of research**	• **Completeness of project**
• **Ability to explain project goals**	• **Originality**
• **Ability to explain technologies involved**	• **Technical challenge**
• **Quality of prototype software (or equivalent)**	• **Universal and/or Applicable Design**
• **Quality of Project Report**	• **Reflective Activity**
• **Overall ability to demonstrate artefact**	• **Attendance and engagement at supervisions sessions**

Marking Criteria	(F) FAIL / VERY WEAK (D)	(C) PASS / GOOD (B)	(A) EXCELLENT
Completeness of Artefact Build	• Not an integrated system – disjoint, un-integrated components • One or more components not working	• system composed of features / integrated components • One or two system features may not be working fully BUT project implementation still forms a coherent system that does a job	• all features of system work well • no apparent missing features – the presented system appears coherent and whole
Originality	• the minimum implemented • little or no evidence of originality	• evidence of some attempts at original ideas	• novel or elegant solution attempted
Technical challenge	• at or below skills/problems attempted in previous year of study • no evidence of technical challenge attempted / not very technically challenging	• technical challenge at a level appropriate for project year • some evidence of technical challenge one or more interesting features implemented	• ambitious problem attempted • successful implementation of technically challenging feature
Universal Design	• difficult to use / understand • GUI / keyboard actions result in unexpected results	• System works – use cases achievable • System response / interactions are predictable / intuitive	• sleek look and feel • easy to use / navigate • feels like a professional application
Project Report	• Project components are not integrated. • Functionality is inconsistent across software components. • Data is not coherent across software components. • Look and feel is not consistent across software components.	• Software components are integrated into one system to some degree. • Data is consistent across software components to some degree but could be better. • Look and feel is consistent across software components. • Functionality is useful and consistent across software components.	• Seamlessly integrated system. • Data consistency is seamless across software components. • Software looks and feels like a professional application and is consistent across all software components.
Overall ability to demonstrate artefact	• Unable to demonstrate software • No evidence of preparation for demonstration. • No diagrams/slides/posters to aid in demonstration of software. • Lack of coherence between presentation and demonstration elements • Unable to answer questions about code and technologies involved.	• Effort in demonstrating software • Individual capable of answering technical questions about code and technologies involved. • Posters/flowcharts/diagrams used to aid in demonstration.	• Software demonstrated in a very professional manner. • Clear evidence that the individual spent the time to think about how best to demonstrate the strengths and weaknesses of their work. • Good use of diagrams/posters/slides/flowcharts as aids to demo software. • Individual/individual clearly familiar with code and technologies involved and able to answer technical questions about same.