Masters Research Project Handbook
School of Computing

A Guide for Master’s Students and Supervisors
MSc in Cloud Computing, MSc in Data Analytics, MSc in FinTech,
MSc in Web Technologies and MSc in Mobile Technologies

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Welcome from Dean of School

The National College of Ireland (NCI) has the reputation of being relevant to the needs of students and employers and hence developing excellence in the academic field.

The School of Computing has expanded greatly in the last few years, reacting quickly to changing needs and developments in the ICT sector.

Our Master’s students come from nearly every continent and bring with them a vast array of experience. Some of you are coming straight from your undergraduate programmes; some of you will be making the giant leap of choosing to return to education after a long period outside of formal education. In short, the NCI postgraduate students are diverse and unique bringing with them a host of different experiences and life lessons that, when shared, create a fantastic learning environment.

Our teaching faculty demonstrate a blend of in-depth industry experience and, academic and research excellence thereby reflecting the needs of our students to gain access to cutting edge academic rigour while developing the necessary skills to apply these new insights to real world situations. Our Master’s programmes are designed in such a way as to complement and advance the technical and research skill set of our students, to allow them to begin to shape their professional career trajectories in a meaningful way.

Postgraduate education is intense and challenging because it needs to be. There is much to learn in order to succeed in your chosen field of study. While the coming months will likely be filled with many long days, they should also be deeply satisfying. Studying as part of the School of Computing, you will learn about the latest technologies in dedicated computer labs. The School of Computing takes pride in the delivery of programmes using innovative problem solving strategies to enhance the learning experience of our students. We also encourage our students to make the most of the non-academic elements of their study programme. Networking is an increasingly important part of any career development plan. Here at the College we provide opportunities for our students to mix socially in order to develop and nurture those relationships during their time at the College and beyond graduation.

Ultimately NCI School of Computing is committed to providing an exceptional educational experience that will help you to achieve your goals. I hope that I will have the opportunity to meet you personally before I have the pleasure of shaking your hand at graduation. I wish you the very best in your studies at NCI and in your career beyond.

Dr Pramod Pathak,
Dean of School of Computing
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1. Introduction

This handbook is intended to provide postgraduate students with a first stop resource to completing the Research Project module in part fulfilment of a MSc Degree at Level 9 of the Irish National Framework of Qualifications.

The Research Project is intended to be a central and integrating element of the MSc Degree programme at NCI. It is designed to afford postgraduate students the opportunity to exercise their creative, questioning, analytic, and writing skills as well as to develop research skills in a focused and practical manner. It is also intended to give students the chance to develop an in-depth understanding of some specific topics related to their chosen discipline and to apply research methods and techniques. One of the main features of a Research Project is that it must be beyond mere description.

People working in different roles within organisations are often required to write and deliver descriptive reports to their managers. The Research Project requires students to “move up a gear” from being a mere story or descriptive narrative to a critical analysis and evaluation of some topic. Typically, this “extra” dimension will require:

- One or more research questions in a particular domain to be identified
- The question(s) to have some theoretical backdrop
- The student to carry out both theoretical and empirical investigations
- To propose, design, implement, evaluate, analyse and discuss an ICT solution related to the programme domain that seeks out to find an answer to the identified research question(s)

The “question” element was identified in the Research in Computing module and it will be dealt with in greater details in the Research Project.

As Research Project is part of a postgraduate course it is also required that students employ and develop their research knowledge and skills in an applied fashion. The Research Project must involve the identification, generation, or collation of relevant primary or secondary data and the ability to analyse them in a meaningful and critical manner.

2. Research Theme in the Masters Programmes

The research component of the MSc programmes in Cloud Computing, Mobile Technologies, and Web Technologies is composed by three modules (see Figure 1):

- Research in Computing (mandatory 5-credit module)
- Research Methods (mandatory 5-credit module)
- Research Project or Industry based Research Project (elective 25-credit module)

1 See http://www.nfq-qqi.com/
The research component of the **MSc Data Analytics** is composed by the two modules (see Figure 2):

- *Research in Computing* (mandatory 5-credit module)
- *Research Project* or *Industry based Research Project* (elective 30-credit module)

Learners must pass the Research in Computing module to commence any of the subsequent modules.

The research component of the **MSc FinTech** is composed by the three modules (Figure 3):

- *Contemporary Topics in FinTech* (mandatory 5-credit module)
- *Entrepreneurship in FinTech* (mandatory 5-credit module)
- *Research Project* or *Industry based Research Project* (elective 25-credit module)
The Contemporary Topics in FinTech module must be passed prior to commencing the research or industry based research project in order to ensure that learners have a viable, actionable as well as feasible research proposal.

In any of the above MSc programmes, learners must only do either the Research Project or the Industry Based Research Project, but not both. In order to ensure the academic standards of all projects, every learner will have an academic supervisor for their project.

Research in Computing and Contemporary Topics in FinTech modules prepare students for their Research Project module. Students learn about research methods and will be able to carry out a research and development project independently.

Research Methods module enhances students’ critical thinking and skills relating to research, it provides them with knowledge on quantitative methodologies, approaches and tools used in research, and develops critical awareness around the selection and application of statistical measures in research.

Research Project/ Industry based Research Project module gives students the chance to develop an in-depth understanding of some specific topics related to their chosen discipline, to apply research methods and techniques and to develop a software/product/artefact.

Through the research-oriented modules, students have the opportunity to engage in a capstone MSc Degree project, either industry-led or academic. If the MSc programme has specialisations, the Research Project should critically analyse and appraise research work done in the selected specialisation and to develop a software/product/artefact.

The academic led Research Project and the Industry-based Research Project run over one semester for full time students and two semesters for part-time students. Students are expected to conduct their research to the same level and standards. No advantage or disadvantage will be attached to one module over the other. The research environment associated with the Research Project vis-a-vis the Industry Research Project differs in terms of location. However, the Research Project Committee will, in all cases, ensure that all research environments are appropriate for the successful completion of projects.

In order to ensure the academic standards of all projects, every student will have an academic supervisor assigned for their project. Industry based Research Projects will always be carried out in a designated ICT related business environment. Such environment is expected to furnish a nurturing work space for the student and can be physically an NCI organisational unit, or an external entity located at any partnering organisation (e.g. a software development group at a private/public company).

2.1 Special Regulations

A student must communicate to the relevant MSc Programme Director and School Programme Coordinator the type of Research Project (academic led or industry led) he/she intends to do at the beginning of the semester when the Research in Computing module is delivered.
A student must pass Research in Computing/Contemporary Topics in FinTech module and not repeat more than 10 credits to be eligible to register for the Academic led Research Project module or Industry-based Research Project module.

If a student does not meet the requirements to register for the Research Project, the student can apply to exit the course with a Postgraduate Diploma award (Level 9) subject to the condition to pass all the taught modules (60 credits in total) exempt Research Methods module. The Exit Award Form is available in Appendix A. The form should be submitted to Registrar.

If the student would like to pursue an Industry based Research Project with a company/organization identified by the student, NCI approval is required prior starting the project. It is strongly recommended that any interested student discusses this option with the relevant MSc Programme Director no later than the beginning of the semester when the Research in Computing/Contemporary Topics in FinTech module is delivered.

2.2 **Research Project Committee**

The Research Project Committee consists of the Research Project Module Owner, the Msc Programme directors, project supervisors, and other academic members involved in the examination process.

The Research Project Committee is responsible for managing the project process, monitoring progress and ensuring completed projects are assessed and graded by a number of academics.

The chair of the Research Project Committee (Research Project Module Owner) is responsible for describing the operation of the research process to the students through the production of a handbook at the start of the academic year. This will involve describing the deliverables, due dates and the grading rubrics.

The chair of the Research Project Committee and the Vice Dean of Postgraduate Programmes & Research will identify appropriate academic members to supervise the research projects and will communicate to the students the assigned supervisors. The academic supervisors will collaborate and will guide the students in creating, implementing, testing and evaluation of the research project.

The Research Project Committee also assigns two examiners to each student. One of the examiners will be the supervisor. The examiners independently write a report on the research project and agree a mark for the project. The report and the marks are reviewed and approved by Research Project Committee.

3. **Supervision**

3.1 **Appointment of Supervisor(s)**

Students pursuing a Research Project are assigned one or two supervisors. In Research (only) Projects, only one supervisor is assigned. A student pursuing an Industry led Research Project
will be assigned an academic supervisor and an industry supervisor. Where two supervisors are appointed, one is designated as the primary supervisor. The primary supervisor assumes all the functions assigned to the ‘supervisor’ in these regulations. The second supervisor is known as the ‘joint’ supervisor but will often play a considerable role in the supervision.

The supervisor/primary supervisor will be a full time academic member or an associate faculty member of the School of Computing, the holder of an award equivalent or higher than that being pursued and he/she has supervised to the pursued award level.

The joint supervisor may be employed by another institution, or a person working in the industry with expertise in the domain of the project.

In exceptional circumstances the Research Project Committee may approve a supervisor not meeting these requirements.

The chair of the Research Project Committee and the Vice Dean of Postgraduate Programmes & Research will identify appropriate academic members, will allocate supervisors and will communicate to the students the assigned supervisor(s).

3.2 The Supervisory Relationship

Each student embarking upon a Research Project in the MSc course will be allocated a supervisor from within the School of Computing. However, it is important to note that your supervisor will not necessarily be an expert in your chosen research domain. The supervisor will have sufficient experience to provide adequate guidance to a student on the production of their Research Project. A student however may approach any academic member or associate faculty within the School of Computing with a view to seeking out guidance on specific topics or issues pertaining to their research. However, it has to be understood that the first marker of an MSc project is the supervisor.

The supervisory relationship is an important one and it is essential therefore that good working relations are established and maintained at all times. There are a number of pointers that can help ensure that the relationship is a business-like and productive one for both parties. First, be sure to meet early on in the process, as soon as you have been assigned.

It is also important in the initial stages of the supervisory relationship that the supervisor(s) and the student agree on the research topics to be investigated, a research plan and timescale, as well as the deadlines for submission of various milestones and deliverables part of the project.

Supervisors also like to read before a meeting any written material being brought by students. Therefore, from an early stage of your research work, make an attempt to always have some written material to bring along - written outline research project topics/ideas to be explored, written lists of articles you have read, a brief description of the tasks you have worked on since last meeting, a possible table of contents for the research project, a timetable for your work output, or individual chapters – whatever is appropriate for the stage you are at.

Students should also avoid giving their supervisor rough drafts or “material I have to do more work on”. There is nothing more annoying for a supervisor than correcting some written material only to be told on handing it back: ‘oh I’ve reworked that completely since I gave it to
you’. Supervisors can only make an informed and useful call on your work if what you submit is your best effort at that point in time.

3.3 **What can I expect?**

In order to ensure as much clarity as possible around the roles of the student and the supervisor the following sections outline what are considered reasonable expectations of both parties.

The research project is the sole responsibility of each student. Students must engage in a proactive manner when undertaking their own research. It is the student’s responsibility to 'drive' their own research and take ultimate responsibility for the decisions they make in their research design and its implementation. The role of supervisor is similar to that of a consultant. They are assigned to offer students advice, counsel and feedback regarding the progress of their research project.

3.3.1 **Student Expectations of the Supervisor**

Students can expect a supervisor to be committed to the research process and act in a professional manner in order to ensure high academic and ethical standards of work. The supervisor will be in a position to advise the student on the suitability of their chosen research topic and determine whether or not it has sufficient merit and scope to be researchable for the purposes of a research project in relation to the award of a MSc degree. Supervisor needs to be accessible to students and to give adequate time for supervision, although students also need to understand that faculty members cannot always be available at short notice and that regular meetings need to be scheduled and agreed in advance. It is not acceptable to just knock at the supervisor’s office door every time you encounter difficulties with your research work and demand the supervisor to talk to you about the project.

At the start of the supervision process, the supervisor needs to discuss and agree with the student their mutual expectations. The supervisor and student need to agree a program of work and an initial timeframe of how often, when and how communication is to occur. It is advisable that the supervisor and student agree the ground rules (i.e. explain their mutual expectations to each other). They should also agree on a schedule of meetings/deadlines and a series of milestones and deliverables as part of the project. The School follows a timetabled supervision model, where typically meetings between supervisors and groups of students occur in timetabled slots and deadlines for deliverables are decided in advance from the Research Committee.

Also, remember that academic members of School may plan on taking annual leave during the period of supervision. They are not required to be available to students at all times and hence it is prudent to ask your supervisor if, and when, they intend taking annual leave so that the student can plan adequately for this.

It is not the responsibility of the supervisor to ensure that their student completes and submits their research project and the required documentation. This is the sole responsibility of the student. A supervisor is there to offer guidance, support and to act as a sound board.
Students are solely responsible ultimately for the quality of the work they produce and the completion of their research project.

3.3.2 Supervisor Expectations of the Student

In part fulfilment of the requirements for the award of a Masters, students are expected to undertake independent research and be responsible for their own research activity. This responsibility is the students and students alone. Full time students are expected to fully dedicate their time for working on their research project and no holidays or full time jobs should be taken.

Students are expected to maintain regular contact with their supervisor, reply to any type of communication received from the supervisor, agree and keep deadlines and report regularly on their progress. Students are also encouraged to document minutes of the meetings that take place with their supervisor and email them to the supervisor. This documentation will ensure that the student understands the feedback given to them each session.

Students also need to be aware of academic regulations and guidelines in relation to the submission of their research project. It is not the responsibility of the supervisor to ensure that a student adheres to these however they may offer guidance on what these regulations are and where further information can be found.

Students are required to attend and to actively participate in all classes scheduled for the Research Methods / Entrepreneurship in FinTech modules that will run in the same semester as the Research Project module.

3.3.3 Supervision Grievance Procedures

A student should make a complaint about the adequacy of supervision in the first instance to their supervisor. Often problems arise as both parties have different expectations of what is appropriate and required. A discussion around expectations and the issues experienced can often be enough to resolve the problem.

Where a problem persists or the parties cannot agree then the matter should be referred to the relevant MSc Programme Director followed by the Vice Dean of Postgraduate Programmes and Research. Please note however that the College is not in a position to offer students a choice of supervisor and hence only serious issues of an academic nature will be tolerated. Complaints about the adequacy of supervision will not be entertained once the research project has been presented for examination i.e. post submission.

4. Research Project Objectives

The aim of Research Project module (academic led or industry based) is for students to consolidate the knowledge and skills acquired in other modules by carrying out a research project that combines both research and technical skills to investigate, design, produce and
evaluate an innovative ICT solution related to the programme area (e.g. Mobile Technologies, Data Analytics, Cloud Computing, FinTech, Web Technologies, etc.).

It is also expected that knowledge and skills gained will contribute not only to scholarship, but also to the generation of innovative solutions to intuitive research questions.

Specifically, the learning outcomes are:

- Analyse, select and implement appropriate research methods and techniques
- Research and critically analyse the state of the art of a problem domain
- Propose, architect and implement an ICT solution related to the programme area
- Evaluate the solution based on identified measures
- Investigate potential future research possibilities
- Present and defend the research findings through a viva, artefact/product demo and research paper style report.

The research project work shall built upon the work conducted as part of Research in Computing // Contemporary Topics in FinTech module, and shall be updated and revised based on feedback from the supervisor.

Regardless of the type of Research Project (academic led or industry based) students have to submit a portfolio (as part of the module assessment) that consists of

- a research paper style report,
- an artefact/product/software
- a configuration manual and
- a presentation to be defended in a viva.

More details on the required assessment components will be presented in the Assessment section.

4.1 Academic led Research Project

The research environment associated with the Research Project is the College and the research work will be coordinated by an academic supervisor.

The research domain and topic will be defined and shaped as part of the research activities required for the Research in Computing / Contemporary Topics in FinTech module. It is the student’s responsibility to identify and propose the research topic of the Research Project. The lecturer that delivers Research in Computing // Contemporary Topics in FinTech module will provide guidelines and advice to the student on the suitability of their chosen research topic and determine whether or not it has sufficient merit and scope to be researchable for the purposes of a research project.
The deliverable to be submitted by the students who elect for the Academic led Research Project is:

- A portfolio that consists of following due for submission at the end of the Semester
  - a research paper style report
  - an artefact/product/software
  - a configuration manual and
  - a presentation to be defended in a viva.

Based on the submitted research proposal as part of the Research in Computing/ Contemporary Topics in FinTech, an academic supervisor(s) will be assigned. The student has the responsibility to participate in all scheduled meetings organised by the supervisor. Typically these meetings are timetabled for groups of students to meet the supervisor.

### 4.2 Industry-based Research Project

The research environment associated with the Industry based-Research Project will be a designated ICT related business research environment. Such environment is expected to furnish a nurturing work space for the student and can be physically an NCI organisational unit, or an external entity located at any partnering organisation (e.g. a software development group at a private/public company) or company.

The agreement of the company/organisation to participate in the industry based research project programme and the approval of the NCI acceptance of the company/organisation is required prior starting to work on the project.

Students should not engage into a research project in collaboration with industry prior discussing this with the Course Director.

Students that elect to undertake an Industry based Research Project should communicate this to the relevant MSc Programme Director and School Office at the beginning of the semester when the Research in Computing module is delivered.

An industry project description and company/organisation contact details have to be submitted by the student to the relevant MSc Programme Director. The research proposal document is written by the student in consultation with the person from the company that will supervise and guide the industry project.

Please note that a research element is required in the project. Projects that involve just software development or testing will not be approved.

The Research Project Committee will assess the suitability of the proposed research topic and determine whether or not it has sufficient merit and scope to be researchable for the purposes of a research project in relation to the award of a Masters degree. The Research Project Committee may approve or reject the proposed industry-based project.
The deliverables to be submitted by the students that elect to undertake the Industry based Research Project are:

- Industry project document and company/organisation contact details due for submission before Research in Computing/ Contemporary Topics in FinTech module starts
- A short research proposal due for submission before the beginning of the semester when Research Project module is delivered
- A portfolio that consists of the following due for submission at the end of the Research Project
  - a research paper style report
  - an artefact/product/software
  - a configuration manual and
  - a presentation to be defended in a viva.
- A monthly industry log book that describes student’s activities and the research in the designated business environment.

Based on the submitted research proposal an academic supervisor will be assigned. The industry supervisor will also be part of the supervisory team. The student has the responsibility to participate in all scheduled meetings organised by the academic supervisor and industry supervisor.

5. Managing the Research Project

This section provides students and supervisors with a framework in which to plan, write and complete the research project.

5.1 Planning the Research Activities

The key to completing a research project on time and without compromising quality is to carefully manage your time and undertake the research in a rigorous and professional manner. Planning your research involves identifying the tasks that need to be undertaken as part of the research and planning where and when to work on particular aspects of the project. The Research in Computing / Contemporary Topics in FinTech and Research Methods modules teach the students research related concepts and develops skills on how to approach the following tasks: define a research question, create a literature review, research and development design and methodologies, and make use of statistical tools to critically assess research outputs and results. Therefore, students are required to use in the Research Project the knowledge acquired in these modules.
As the project progresses toward the final stage, it is likely that it will become more focused on writing tasks. Starting to write at an early stage on the research report ensures that you get used to the routines of writing. This can help you to complete your research project in a timelier manner.

It is also important to set realistic and achievable deadlines when working on the project and to be willing to revise them as the research progresses.

The Research Project involves a high level of independent study and learning with significant number of hours dedicated for the project work. By delaying getting started to work on the project or making excuses as reasons for not starting the work, the quality of the research project will be compromised and deadlines may be missed.

The challenge, particularly for part-time students who are attempting to complete a research project while dealing with the day to day demands of daily life, is to find the time to dedicate to their study.

The key to success is setting aside adequate time on a weekly basis and being disciplined in terms of sticking to these commitments.

The use of GitHub is encouraged as a collaborative tool to enable students to work on the development of the project. It will also improve the transparency of projects for examiners as it will enable them to clearly identify the work carried out by students as part of the project.

### 5.2 Research Ethics

Any research involving human participants that is conducted by students or staff at the National College of Ireland should be done so in an ethical manner. The college has therefore developed an Ethics Committee, which acts as a sub-committee of the Research Committee, to ensure that ethical principles pertaining to research involving human participants are upheld and adhered to.

All students intending to use human participants (or data corresponding to individuals that is not secondary in nature, e.g. social media) as part of their projects must consult the College’s Research Ethics Committee if the research project involves the following:

- direct experimentation on individuals;
- surveys or questionnaires administered to individuals;
- use of data derived from individual records where individuals might be identified;
- experimentation on animals.

Students must submit the Ethical Review Application Form (Appendix C) to the School Filter Committee at research proposal stage. The submission deadline is communicated by the relevant Msc Programme director on the Research Project Moodle page. If the research project does not involve human participants, the Ethics Declaration Form (Appendix D) is required instead of the Ethical Review Application Form (Appendix C).
Following consideration of research projects submitted for Ethical Review, the School Filter Committee will submit a report to the Ethics Committee summarising the applications considered and the decisions made regarding the ethical risk level.

For research that is deemed to fall under low ethical risk (Research Category A), a favourable outcome at the School Filter Committee will be sufficient to secure ethical approval. Research falling under the other two categories (Research Category B and C) must however be considered by the Ethics Committee before approval may be granted.

More details regarding Research Ethics and the procedures required for seeking ethical approval of research involving human participants can be found on the NCI student portal in the Ethical Guidelines and Policies for Research Involving Human Participants.pdf document available under the Academic Policies web page.

### 5.3 Problems with Academic Writing

Some students may encounter difficulties when they have to write an academic report. Most common problems faced while writing a document are: difficulty in formulating what to write, difficulty with bringing ideas into a coherent shape, not having the academic writing skills, etc. Issues of this nature need to be addressed at an early stage to prevent them from developing into serious difficulties.

Here are some practicable solutions that can be tried.

- Perform writing tasks at an early stage of your research project in order to increase confidence and writing skills. Examples of writing tasks are: reviews of literature create notes on your research findings/ test results, write brief analysis of the read papers/articles.
- Request feedback from your supervisor on what you have written. Supervisors can help by given guidelines on writing tasks, including the length, scope, content, structure and aims of each task.
- Meet and discuss with your colleagues the research findings, share writing experiences or discuss and critique an article.

Students may also look for support from the NCI Learning Development Service part of the NCI’s Student Services and Support Department. More details can be found on NCI student portal.

### 6. Assessment of the Research Project

The following documents are required to be submitted electronically online on the Research Project Moodle page, as part of the Research Project (academic led or industry based) assessment, no later than the provided submission deadline.

- a research paper style report,
- an artefact/product/software,
- a configuration manual and
- a presentation to be defended in a viva.

The research paper style report shall comprise up to 20 pages, (approx. 4,000 to 6,000 words), and describes the individual research outcome and production of an ICT solution. This report shall built upon the work conducted as part of Research in Computing module, updated and revised based on feedback from supervisor(s). The students may be penalised due to superfluous text and are strongly advised to stay within 10% of the given page limits.

It shall follow the structure of a research paper that includes: abstract, introduction, literature review, research methodology, design and implementation, evaluation, conclusion and discussion.

The configuration manual shall describe the required software tools and settings in order to successfully replicate the experimental setup. This manual is submitted separately from the research paper style report and it will not count towards the suggested word count. It should not discuss how to install standard software or tools.

The viva shall involve a presentation of the research work carried out and a demonstration of the final results to at least two academic examiners. A demo of the artefact/product developed will be required to be presented in the viva. The learner must attend the viva in order pass the (Industry-led) Research Project.

### 6.1 Marking Schema

The Research Project module marks are determined using the following schema.

<table>
<thead>
<tr>
<th>PROJECT COMPONENT</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project specification</td>
<td>10%</td>
</tr>
<tr>
<td>Literature review</td>
<td>10%</td>
</tr>
<tr>
<td>Artefact/ Project Development</td>
<td>30%</td>
</tr>
<tr>
<td>Artefact/ Product evaluation, conclusion and future work</td>
<td>25%</td>
</tr>
<tr>
<td>Configuration manual, document presentation, and references</td>
<td>15%</td>
</tr>
<tr>
<td>Viva</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Note: 5% out of 15% for “Configuration manual, document presentation / structure, and referencing” is allocated for the configuration manual.
6.2 Research Paper Style Report

A research paper style report describes the individual research project specification and software/artefact development as well as the testing/evaluation results. A literature review should also be included to ensure the validity of the research area. Students are also required to critically analyse insights gained throughout evaluation of their software/artefact development. The work presented in this report shall build upon the work conducted as part of Research in Computing module.

The research paper style report shall comprise up to 20 pages (approx. 4,000 to 6,000 words) and describes the individual research outcome and production of an ICT solution. It shall follow the structure of a research paper that includes: abstract, introduction, literature review, methodology, design and implementation, evaluation, and conclusions and discussion. The students may be penalised due to superfluous text and are strongly advised to stay within 10% of the given page limits.

The report template provided on the module’s Moodle page must be used when editing the research paper style report.

6.2.1 Report Structure

It is expected that the report to be submitted to consist of the following key components:

- **Abstract:** The role of the abstract is to summarise the project you have undertaken in a concise manner, highlighting the scope of the project, the objectives, the methodology and its finding and results.

- **Introduction:** the main purpose of the introduction is to motivate the contribution of the research work. It should include background on the research topic, the justification for the research and what gap in the literature it seeks to fill, the main research questions and hypotheses, and the organization of the study.

- **Up-to-date Review of the Literature/Background/ Literature Survey:** The literature review should demonstrate evidence of independent research critically analysing the potential of an application / idea and provide insights into how it can be implemented and evaluated. This component shall built upon the literature review work conducted as part of Research in Computing // Contemporary Topics in FinTech module, and shall be updated and revised based on feedback from supervisors and based on the final developed product.

- **Research Methodology:** The main purpose is to outlines the proposed research approach and method, justifies the choice of method(s) leveraging appropriate literature to substantiate choices / assumptions and/or key decisions, and considers the limitations and strengths of that approach, as well as demonstrating how the method(s) will be applied in answering the research question(s).

- **Design Specification:** The techniques and/or architecture/framework that underlie the implementation and the associated requirements are identified.
• **Implementation/Solution Development**: The purpose is to describe only the final stage of the implementation. It must not contain code listings or a user manual/guides.

• **Evaluation**: A comprehensive analysis of the results and main findings of the study using multiple strategies as well as the implications of these finding both from academic and practitioner perspective are presented. For example, an algorithm may be comprehensively benchmarked using novel performance specific metrics on the Cloud Competency Centre facilities or external cloud providers; an internet application or mobile application may be evaluated using suitable usability testing techniques. Statistical tools should be used to critically evaluate and assess the experimental research outputs and levels of significance.

Due to page number limitation only the most relevant results are analysed and presented as an evidence to support or reject the hypothesis.

• **Conclusions and Discussion**: A brief reiteration of the main research questions addressed and what was found as outcome of the research work is provided. Insights gained throughout the development and evaluation of the proposed solution are critically analysed and discussed. In addition, further avenues for research and commercialization should be identified.

• **References**: Correct citation references must be included

• **Appendix**: Configuration manual should be provided as a different file from the research paper style report and it will not count towards the suggested word count.

Remember that all figures, tables, photographs etc. should be referenced and numbered in the report e.g. the graph (Fig 1) which complements the Table (Table 1).

It is highly recommended that students take some time at the start of the research process to go to the library and review other Masters Research projects. This will give you a feel for the type of appropriate research questions, the research approaches adopted and the format of the report.

The research report should NOT contain a table of contents. If appropriate, the configuration manual may contain a table of contents.

**6.2.2 Literature Review**

The purpose of the literature review is to convey to the reader what knowledge and ideas have been established on a set of research topics from a particular domain, and what their strengths and weaknesses are. It also gives you, the writer the opportunity to show your ability to identify, access, understand and critically evaluate relevant material in top rate academic journals.

The literature review must be defined by a guiding concept (e.g., the problem or issue you are discussing or your argumentative research project). **It is not a descriptive list of the material available, or a set of summaries.** It is not recommended to start every paragraph with the name of an author as this may mean that the literature is organised alphabetically or chronologically and not by concepts or topics investigated.
A succession of “cut and paste” article summaries is **NOT** a literature review either!

The following guidelines should be considered when writing the literature review section.

- The literature review should be organised around and related directly to the research project or research question you are developing.
- Any article discussed and analysed in the literature review must have a reference. The full reference should be included in the References section of the project report.
- The literature review should be as current and up to date as is practicable
- Do not cite any reference you have not read.
- The literature review should end with a summary of what is and is not known, should highlight “gaps” in the literature, either acknowledged or discovered, and should formulate questions that need further research.

**Tips on conducting a Literature Review:**

- [http://www.writing.utoronto.ca/advice/specific-types-of-writing/literature-review](http://www.writing.utoronto.ca/advice/specific-types-of-writing/literature-review)
- [https://web.njit.edu/~egan/Writing_A_Literature_Review.pdf](https://web.njit.edu/~egan/Writing_A_Literature_Review.pdf)

### 6.2.3 Research Methodology

The aim of the Research Methodology section is to provide details regarding

- the steps followed in the research work (process)
- the data (e.g. database records, tools, software, algorithms, metrics, etc.) you need in order to be able to answer your research question;
- how you get and use those data,
- how the data and the results that are collected or measured in the project are analysed.

Usually the data requirements are specified in a number of research objectives. These objectives are a form of data “shopping list” and clarify what kind and amount of data you need to collect.

### 6.2.4 Design and Solution Development

The report should provide details on technologies, techniques and/or architecture/framework that underlie development and implementation of the solution proposed to answer the research question.

A description of the developed solution should present your technical work. Only the final stage of the developed solution should be presented.
Due to the space limitation (the report should not exceed 20 pages) code should not be included in the report. For example, if an algorithm was proposed, implemented and tested a pseudocode or word-based steps description of the algorithm may be included. The student can show and discuss the code of the algorithm during the demo run in the viva. The students may be penalised due to superfluous text and are strongly advised to stay within 10% of the given page limits

6.2.5 Evaluation and Results Analysis

A comprehensive set of tests should be run by the student in order to evaluate and validate the proposed solution. However, only the most relevant results should be presented in the report. All figures and tables should be numbered and referred in the text of the report. The meanings of the data (e.g. numbers) presented in the tables and figures should be explained in the report.

The students should also present in the project report a comprehensive analysis of the results the main findings of the study using multiple strategies as well as the implications of these finding both from academic and practitioner perspective are presented.

It is also important to situate findings in the literature. Do your findings support, contradict or modify the findings of those authors on whom you have drawn your research question?

6.2.6 Conclusion and Discussion

Conclusion and Discussion section is a very important part of the report. It has to briefly reiterate the research question(s) addressed and to summarize the most important outcomes of the research work. Insights gained throughout the development and evaluation of the proposed solution are critically analysed and discussed.

In addition, further avenues for research that could be explored should be discussed.

The relevance of the research output to different stakeholders (e.g. companies, institutions services, end-users, clients, etc.) and potential for commercialization should also be discussed.

6.2.7 References

This should contain a full list of any source directly referred to or quoted in the text following the format provided in the research project template.

The NCI library has developed a number of useful tools to assist students with both their in-text referencing and the presentation of their reference lists. If you are unsure how to reference correctly, please consult these tools.

As the research project report should not have more than 20 pages you must select and refer in the text the most relevant references that related to your research topic and work. The students may be penalised due to superfluous text and are strongly advised to stay within 10% of the given page limits
6.2.8 Report Template

The research paper style report should comply with a specific presentation style and format as pre-defined by the report template provided on the Moodle page.

6.3 Oral Examination (Viva)

Students must attend an examination session ("viva") where they will give a presentation on their research work. A demonstration of the artefact/product developed and of the final results will be required to be presented during the viva to at least two examiners. One of the examiners will be the supervisor.

The student must attend the viva.

This is a short individual oral presentation that students are required to deliver. This presentation should give insight into some aspects of your research interests and you should be prepared to answer questions from the audience on your presentation.

The presentation shall use visual aids as appropriate including slides (PowerPoint, LaTeX Beamer, etc.).

The student will be assessed by two examiners from School of Computing. One of the examiners will be the supervisor.

The date and time when the Viva will take place will be communicated to the student and on the Moodle page.

The viva should be organised/planned by the student (roughly) as follows (points 1, 2, and 3 should not exceed 30 min in total):

1. 10 min conference-style presentation that encompasses all key aspects of the work, i.e. all sections of the report
2. 5-10 min live demo of key artefacts/components of the evaluation
3. 10 min of questions by examiners

10 min discussion time is allocated to the examiners to finalise the assessment in the absence of the student.

7. Plagiarism

Plagiarism arises when extracts from someone else’s work are used without acknowledgement, i.e. in the case of written work, not italicised, not set in quotation marks and not referenced.
This is not limited to text but can also include graphics, tables, photographs, video, music, and computer code.

Plagiarism is also submitting the same piece of work for assessment under multiple modules;
Plagiarism is not an acceptable practice and will cause a piece of work to be penalised or regarded as null.

The submission of plagiarised materials for assessment purposes is fraudulent and all suspected cases will be investigated and dealt with appropriately by the College following the procedures outlined here and with reference to the Code of Discipline

If perpetrated on a substantial scale, especially with intention, disqualification from an examination or award may occur.

Whilst some cases of plagiarism can arise through poor academic practice with no deliberate intent to cheat, this still constitutes a breach of acceptable practice, and requires to be appropriately investigated, and acted upon.

The official regulations regarding plagiarism are presented in the Plagiarism document available on the NCI Student Portal under Academic Policies and supplementary information is included on School notice boards and appropriate hand-outs to learners.

Students are required to sign a short declaration (See Appendix A – Project Submission Sheet) that the research paper style report submitted by them for assessment purposes is their own. This statement is attached to the report and requires acknowledgment that the student has read and understood the plagiarism regulations.

8. Library Resources

The Library Help Centre delivers classes and offers one-to-one consultations on a number of topics including online resources, referencing and conducting literature reviews.

8.1 Information Project Officer

The Information Project Officer offers one-to-one consultations to postgraduate students on a number of topics; if you have a detailed enquiry you are invited to make an appointment. Specific assistance is provided in the areas of (a) accessing the library webpage and using the library catalogue, (b) online databases, (c) research strategies, (d) academic writing, (e) referencing, (f) conducting a literature review and (g) accessing the past exam papers database and theses.

2 http://libguides.ncirl.ie/staffguide/researchandteachinghelp
8.2 Citations

All work submitted by students for assessment purposes is accepted on the understanding that it is their own work and written in their own words except where explicitly referenced using the accepted norms and formats of the appropriate academic discipline. The style of referencing to be used for Research Project is specified in the report template provided on the Moodle page. Please refer to the How to Reference3 section of the NCI Library for further details.

At the end of the research paper style report, there should be a section marked “References” where all references should be listed in full.

9. Copyright, Intellectual Property and Commercialisation

Copyright in the Research Project report resides with the student. All other intellectual property (including inventions, discoveries, copyright in computer software (including source and object codes) and other kinds of copyright, semiconductor mask works, trade secrets, know how, research data, tangible research property and similar property/rights) conceived, invented or reduced to practice by the student during, or as a result of, research undertaken at the College shall be the property of the National College of Ireland. College policy with respect to ownership and exploitation of intellectual property (IP) is set out in the current NCI Intellectual Property Policy (to which the attention of the candidate is drawn generally). The NCI Intellectual Property Policy document is available on the NCI student portal under Academic Policies web page (https://myncistudent.ncirl.ie/AcademicPolicies/Pages/default.aspx). Benefits accruing to the College from the subsequent commercialisation of the intellectual property referred shall be allocated in accordance with such policy.

Students that wish to commercialise their research work or a project related technology have the opportunity to explore this path. In this case, students will be required to complete and submit to Programme Director the NCI Invention Discourse Form available from IP Policy Document published on the NCI student portal.

This document aims to identify the potential commercial opportunities, to explore the related markets and to justify the commercialisation of products or services as results of work done for the project.

Technology commercialisation applications will be reviewed by NCI Technology Transfer Office in terms of commercialisation potential. If application approved, NCI will provide protection for company spin-out, protection of the invention and support for negotiation of licence agreement.

3 https://www.ncirl.ie/Library/Libary-Help-Centre/How-To-Reference
10. Deadline Extensions, Exit, Withdrawal and Deferral of the Course

The research project submission date is absolute and final. Applications for extensions will not be tolerated except in line with those circumstances as set forth in the College Regulations. Any student seeking to obtain an extension should first consult the College Regulations.

Occasionally and after consultation with the relevant Msc Programme Director, a student may decide to withdraw or defer their studies prior to completion of their Research Project. In this instance the student must consult the College Regulations in relation to deferrals and contact the relevant MSc Programme Director to seek guidance on what the consequences of any such action may be.

If the student does not want to complete the Research Project module may apply to be transferred to the Postgraduate Diploma course. An Exit Award Form (see Appendix B) must be submitted to Registrar. The student must achieve the required credits to exit with the Postgraduate Diploma once the transfer request was approved.

If the student wishes to withdraw from the course or to apply for deferral from the course he/she has to communicate this to the NCI Registrar and the relevant MSc Programme Director.
11. Submission Deadlines

11.1 Full Time MSc programmes - Research Project Commencing in September 2019

<table>
<thead>
<tr>
<th>MSc in Data Analytics</th>
<th>Thursday, 12\textsuperscript{th} December 2019, pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSc Cloud Computing</td>
<td>Moodle online submission of the following</td>
</tr>
<tr>
<td>MSc FinTech</td>
<td>• Research Paper style Report</td>
</tr>
<tr>
<td></td>
<td>• ICT Solution</td>
</tr>
<tr>
<td></td>
<td>• Configuration Manual (independent to the</td>
</tr>
<tr>
<td></td>
<td>Research Paper Report)</td>
</tr>
<tr>
<td></td>
<td>TWO printed spiral bound copies of the paper style</td>
</tr>
<tr>
<td></td>
<td>report and configuration manual to be submitted</td>
</tr>
<tr>
<td></td>
<td>to the School of Computing Office on Friday 13\textsuperscript{th} December 2019 by 2pm</td>
</tr>
<tr>
<td></td>
<td>Project Submission Sheet to be included (see Handbook</td>
</tr>
<tr>
<td></td>
<td>document- Appendix A).</td>
</tr>
<tr>
<td></td>
<td>A Moodle submission receipt of the online report</td>
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<tr>
<td></td>
<td>submission must be attached to each hard copy of</td>
</tr>
<tr>
<td></td>
<td>the report.</td>
</tr>
</tbody>
</table>

| Viva/ Presentation    | Wed 8th January 2020 – Wed 15\textsuperscript{th} January 2020 |
| Feedback              | Wed 22\textsuperscript{nd} January 2020 onwards |
### 11.2 Full Time and Repeat MSc programmes - Research Project
Commencing in January 2020

<table>
<thead>
<tr>
<th>Programme</th>
<th>Submission Details</th>
</tr>
</thead>
</table>
| MSc in Data Analytics  | Thursday, 23rd April 2020, 2pm<br>
| MSc Cloud Computing    | Moodle online submission of the following<br>
|                        | TWO printed spiral bound copies of the paper style report and configuration manual to be submitted to the School of Computing Office. Project Submission Sheet to be included (see Handbook document- Appendix A) by Friday 24th of April 2020 at 2pm. A Moodle submission receipt of the online report submission must be attached to each hard copy of the report. |

| Viva/ Presentation     | Wed 6th May – Wed 13th May 2020 |
| Feedback               | Wed 20th May 2020 onwards |
### 11.3 Part Time and Top-up MSc programmes - Research Project

**Commencing in January 2020**

<table>
<thead>
<tr>
<th>MSc in Data Analytics</th>
<th>Thursday, 23rd April 2020, 2pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSc in Cloud Computing</td>
<td>Moodle online submission of the following</td>
</tr>
<tr>
<td>MSc Top-Up in Data Analytics</td>
<td>• Research Paper style Report</td>
</tr>
<tr>
<td>MSc Top-Up in Cloud Computing</td>
<td>• ICT Solution</td>
</tr>
<tr>
<td></td>
<td>• Configuration Manual (independent to the Research Paper Report)</td>
</tr>
<tr>
<td></td>
<td>TWO printed spiral bound copies of the paper style Report and Configuration manual to be submitted to the School of Computing Office. Project Submission Sheet to be included (see Handbook document- Appendix A) by Friday 24th of April 2020 at 2pm.</td>
</tr>
<tr>
<td></td>
<td>A Moodle submission receipt of the online report submission must be attached to each hard copy of the report.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Viva/ Presentation</th>
<th>Wed 6th May – Wed 13th May 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback</td>
<td>Wed 20th May 2020 onwards</td>
</tr>
</tbody>
</table>

## 11.4 Full Time MSc programmes - Research Project Commencing in May 2020

<table>
<thead>
<tr>
<th>MSc in Cloud Computing</th>
<th>Deadlines to be decided</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSc in Data Analytics</td>
<td>Moodle online submission of the following</td>
</tr>
<tr>
<td>MSc in FinTech</td>
<td>• Research Paper style Report</td>
</tr>
<tr>
<td></td>
<td>• ICT Solution</td>
</tr>
<tr>
<td></td>
<td>• Configuration Manual (independent to the Research Paper Report)</td>
</tr>
<tr>
<td></td>
<td>TWO printed spiral bound copies of the paper style Report and Configuration Manual to be submitted to the School of Computing Office.</td>
</tr>
<tr>
<td></td>
<td>Project Submission Sheet to be included (see Handbook document- Appendix A).</td>
</tr>
<tr>
<td></td>
<td>A Moodle submission receipt of the online report submission must be attached to each hard copy of the report.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Viva/ Presentation</th>
<th>Deadlines to be decided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedback</td>
<td>Deadlines to be decided</td>
</tr>
</tbody>
</table>

| Final version of the Research Paper style Report and Configuration Manual (electronic format) | Deadlines to be decided |
## 12. Useful Contacts

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Telephone Number</th>
<th>E-mail Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean of School of Computing</td>
<td>Dr Pramod Pathak</td>
<td>4498 611</td>
<td><a href="mailto:pramod.pathak@ncirl.ie">pramod.pathak@ncirl.ie</a></td>
</tr>
<tr>
<td>Vice Dean Postgraduate Programmes and Research</td>
<td>Professor Christos Grecos</td>
<td>4498 643</td>
<td><a href="mailto:christos.grecos@ncirl.ie">christos.grecos@ncirl.ie</a></td>
</tr>
<tr>
<td>Programme Director MSc in Cloud Computing (Part-time and Full-time)</td>
<td>Dr Horacio González-Vélez</td>
<td>4498529</td>
<td><a href="mailto:horacio.gonzalez-vellez@ncirl.ie">horacio.gonzalez-vellez@ncirl.ie</a></td>
</tr>
<tr>
<td>Programme Director MSc in Data Analytics (Full-time)</td>
<td>Mr Michael Bradford</td>
<td>4498619</td>
<td><a href="mailto:michael.brADFORD@ncirl.ie">michael.brADFORD@ncirl.ie</a></td>
</tr>
<tr>
<td>Programme Director MSc in Data Analytics (Part-time)</td>
<td>Dr Anu Sahni</td>
<td>4498622</td>
<td><a href="mailto:Anu.Sahni@ncirl.ie">Anu.Sahni@ncirl.ie</a></td>
</tr>
<tr>
<td>Programme Director MSc FinTech</td>
<td>Dr Ade Fajemisin</td>
<td>4498531</td>
<td><a href="mailto:Ade.Fajemisin@ncirl.ie">Ade.Fajemisin@ncirl.ie</a></td>
</tr>
<tr>
<td>Programme Director MSc in Mobile Technologies and Web Technologies</td>
<td>Dr Cristina Hava Muntean</td>
<td>4498623</td>
<td><a href="mailto:cristina.muntean@ncirl.ie">cristina.muntean@ncirl.ie</a></td>
</tr>
<tr>
<td>Programme Co-ordinator: MSc Programmes</td>
<td>Ms Margarete Silva</td>
<td>4498654</td>
<td><a href="mailto:margarete.silva@ncirl.ie">margarete.silva@ncirl.ie</a></td>
</tr>
<tr>
<td>Project Information Officer</td>
<td>Mr Keith Brittle</td>
<td>4498645</td>
<td><a href="mailto:Keith.brittle@ncirl.ie">Keith.brittle@ncirl.ie</a></td>
</tr>
<tr>
<td>Registrar’s Office</td>
<td>Mr John McGarrigle</td>
<td>4498514</td>
<td><a href="mailto:jmccarrigle@ncirl.ie">jmccarrigle@ncirl.ie</a></td>
</tr>
<tr>
<td>Library</td>
<td></td>
<td>4498590</td>
<td><a href="mailto:library@ncirl.ie">library@ncirl.ie</a></td>
</tr>
<tr>
<td>Student Services</td>
<td></td>
<td>4498556</td>
<td><a href="mailto:studentservices@ncirl.ie">studentservices@ncirl.ie</a></td>
</tr>
<tr>
<td>Exams Office</td>
<td></td>
<td>4498587</td>
<td><a href="mailto:examinations@ncirl.ie">examinations@ncirl.ie</a></td>
</tr>
<tr>
<td>International Office</td>
<td>Ms Sheila Mahon</td>
<td>4498695</td>
<td><a href="mailto:sheila.mahon@ncirl.ie">sheila.mahon@ncirl.ie</a></td>
</tr>
<tr>
<td>SoC Ethics Filter Committee</td>
<td>Dr Cristina Hava Muntean</td>
<td>4498623</td>
<td><a href="mailto:cristina.muntean@ncirl.ie">cristina.muntean@ncirl.ie</a></td>
</tr>
</tbody>
</table>
13. Appendix A - Project Submission Sheet

National College of Ireland
MSc Project Submission Sheet – 2019/2020

School of Computing

Student Name: ..................................................................................................................

Student ID: ..................................................................................................................

Programme: .............................................................................................................. Year: ..............

Module: ....................................................................................................................... ...

Lecturer: ....................................................................................................................... ...

Submission Due Date: ...................................................................................................

Project Title: ..............................................................................................................

Word Count: ...................................................... Page Count: ........................................

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project. ALL internet material must be referenced in the bibliography section. Students are required to use the Referencing Standard specified in the report template. To use other author’s written or electronic work is illegal (plagiarism) and may result in disciplinary action. Students may be required to undergo a viva (oral examination) if there is suspicion about the validity of their submitted work.

Signature: .....................................................................................................................

Date: ............................................................................................................................

PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

Attach a completed copy of this sheet to each project (including multiple copies) □

Attach a Moodle submission receipt of the online project submission, to each project (including multiple copies). □

You must ensure that you retain a HARD COPY of the project, both for your own reference and in case a project is lost or misplaced. It is not sufficient to keep a copy on computer. □

Assignments that are submitted to the Programme Coordinator Office must be placed into the assignment box located outside the office.

Office Use Only

Signature: .....................................................................................................................

Date: ............................................................................................................................

Penalty Applied (if applicable): ..........................................................
14. Appendix B - Exit Award Form

AWARD EXIT / TRANSFER FORM

This form should be used if you wish to transfer from one programme to another or if you wish to exit with an award from the National College of Ireland. The completed form must be submitted to the Registrar's Office, National College of Ireland, Mayor Street, IFSC, Dublin 1.

Name:  
Address:  

Student Number:  

I wish to transfer from my current programme  
Transfer to [Programme Title]:  
Transfer to [Programme Code]:  
Year:  

OR

I wish to apply for an exit award from:
Exit Award [Programme Title]:  
Exit Award [Programme Code]:  
Year:  

Summarise what programme you are applying to exit from / transfer to:

Student Signature:       Date:  
ECTS Credits have been accumulated [Tick Box]:  Yes  No
Internal Approval:       Date:  
15. Appendix C - Human Participants Ethical Review Application Form

National College of Ireland

Ethical Guidelines and Procedures for Research involving Human Participants

SEPTEMBER 2019
1. Introduction

All research involving human participants that is conducted by students or staff at the National College of Ireland should be done so in an ethical manner. The college has therefore developed an Ethics Committee, which acts as a sub-committee of the Research Committee, to ensure that ethical principles pertaining to research involving human participants are upheld and adhered to. All researchers intending to use human participants as part of their projects are thus required to reflect upon any potential ethical issues and submit their research proposals for ethical review before commencing data collection.

This document gives an overview of the core ethical principles guiding research in NCI, while also documenting the procedures required for seeking ethical approval of research involving human participants.

Am I conducting research?

Research is defined as “the attempt to derive generalisable new knowledge by addressing clearly-defined questions with systematic and rigorous methods” (NHS Health Research Authority). Sometimes, we collect data in order to evaluate a service or practice we are engaged in (“service evaluation”). The main difference between research and service evaluation is in the aim: research is trying to create new generalisable knowledge, and service evaluation is trying to evaluate whether a delivered service/practice is working well. One project may have both aims included in it. It can be confusing if a service or intervention is being evaluated, whether or not research is being conducted. If new or competing interventions are being evaluated, then it is likely to be research, whereas if an existing service is being conducted anyway, with an evaluative component, then it is likely to be a service evaluation. Research requires consideration of the below guiding principles, whereas service evaluation does not require approval from an ethics committee.

2. Guiding Principles

In line with other research institutions, there are three core guiding principles governing the ethical conductance of research involving human participants at NCI. These principles stem from the Belmont Report (1979) published by the National Commission for the Protection of Human Subjects of Biomedical and Behavioural Research. While it is recognised that these principles may be operationalised differently depending on the specific research discipline, it is recommended that these are consulted as a starting point for any research involving human participants.

2.1 Principle 1: Respect for Persons

This principle entails recognition that participants should be treated as autonomous individuals and hence should never be coerced or swayed into participating in a research project against their will. The participant’s right to withdraw from a research study at any time should be respected, as well as their right to dignity and protection from harm.

Respect for individuals can often be implemented in practice via the process of informed consent, whereby potential participants are made fully aware of the requirements involved in participation. While it is recognised that in certain cases deception (i.e. the withholding of certain information from
participants) may take place, this should only occur when it is robustly justified for the validity of the research. In cases where deception is justified, researchers should ensure that any potential risk resulting from this measure is minimised. Participants should also be fully debriefed on the nature of the research after it has taken place.

The principle of respect also requires researchers to protect individuals from vulnerable groups who may have diminished autonomy (see section 4.2 for more detail as to what constitutes vulnerable groups). Where full informed consent is not possible for such population groups, consent may instead be sought from their guardians. In all cases however clear assent, or willingness to participate, should be demonstrated from participants.

2.2 Principle 2: Beneficence and non-maleficence

This principle specifically focuses on the need to protect the well-being of participants. Any potential risk to participants should be minimised, whether that be risk of physical discomfort or of any psychological, emotional or social distress, while possible benefits should be maximised. Researchers adhering to this principle should thus ensure that any potential benefits derived from carrying out the study (e.g. in terms of knowledge gained) should outweigh potential risks. Even in cases where there is only a slight potential risk of harm, participants should be provided with appropriate support to alleviate this.

2.3 Principle 3: Justice

This principle emphasises the need to employ fairness in the distribution of benefits and risks to participants. The way in which participants are selected to take part in research should relate to the purpose of the study, as opposed to other factors such as availability or manipulability of participants. The exploitation of vulnerable populations should be avoided.

Where applicable, researchers are encouraged to consult guidelines stemming from their own professional bodies (e.g. The Psychological Society of Ireland) in addition to the general guiding principles above when planning their research. Researchers should also be sensitive to those issues which are specific to the population under investigation and the methodology that is employed in the project (e.g. qualitative methodologies involving the recording of data may raise issues relating to participants’ right to anonymity, as well as the ethical management and use of data). Detailed consideration should be given to all these issues when planning research and when completing the Ethical Review Application form.

3. Ethics Committee

The NCI Ethics Committee was established by the Academic Council in 2012. Acting as a sub-committee to the Research Committee, its role is to oversee ethical issues arising from all research involving human participants that is conducted by students and staff of the college. The key purpose of this committee is to safeguard against any potential harm to participants, and to ensure that their rights are recognised in line with the guiding principles outlined above.
The Ethics Committee reviews all research proposals posing ethical risk to the participants involved, however the decision as to whether projects pose ethical risk is firstly made via the appropriate Filter Committee which operates at School level (see organisational structure in Figure 1 below). The Filter Committees may review and approve research proposals which are of low ethical risk, while referring those of high ethical risk to be considered by the Ethics Committee (see categories of ethical risk in section 4.1).

While the Filter Committees are made up of staff members with subject-specific knowledge, membership of the Ethics Committee should comprise of no less than five representatives from both the School of Computing and the School of Business, including representatives from the Research Committee.

![Figure 1: Committee Structures.](image)

4. **Review Process**
Any staff or student of NCI wishing to conduct a study involving human participants should first submit the Ethical Review Application Form (included at the end of this document), to the relevant School Filter Committee at proposal stage. This initial review will result in a graded categorisation of ethical risk, as outlined below.

4.1 **Categorisation of Ethical Risk**

**Research category A**
Research in this category poses little ethical risk to the participants involved. Specifically, it refers to research involving human volunteers, but excluding studies involving:
- therapeutic interventions
- new research methodologies
- vulnerable populations (see section 4.2)
• deception of the participants
• any other significant physical, social or psychological risk to participants

**Research category B**
Research in this category involves human volunteers **including** studies involving:
• therapeutic interventions
• new research methodologies
• vulnerable populations (see section 4.2)
• deception of the participants
• any potentially significant risk to participants

**Research Category C**
This specifically refers to research involving human volunteers who are service users, patients, staff, records, etc., within the sphere of the HSE or similar setting (but not including clinical trials of investigative medicinal products).

**4.2 Vulnerable groups**
There are a number of participant populations that may fall under the heading of ‘vulnerable groups’. These groups require consideration of unique ethical challenges regardless of the nature of the project. Research involving such populations should therefore always be reviewed by the Ethics Committee.

Groups that may be classed as vulnerable include, but are not limited to:
• Children (under 18 years of age)
• The older old (aged 85+)
• People with an intellectual or learning disability
• Individuals or groups receiving help through the voluntary sector
• Those in a subordinate position to the researcher (e.g. employees)
• Any other groups who might not understand the research and consent process

Note: in addition to the Ethical Review process, any researchers intending to work directly with children will be required to undergo Garda Vetting in advance of the proposed research.

**4.3 Exemption from Full Ethical Review**
In certain limited cases, researchers can apply for an exemption from full ethical review. In such cases, the Ethical Review Exemption form should be completed, explicitly detailing why the exemption is sought.

In completing this form, researchers must declare that the research does not involve any of the following:
• Vulnerable groups
• Sensitive topics
• Risk of psychological or mental distress
• Risk of physical stress or discomfort
• Any other risk to participants
• Use of drugs or invasive procedures (e.g. blood sampling)
• Deception or withholding of information from participants
• Conflict of interest issues
• Access to data by individuals or organisations other than the researchers
• Any other ethical dilemmas

4.4 Outcomes of Review Process
Following consideration of research projects submitted for Ethical Review, each Filter Committee will submit a report to the Ethics Committee summarising the applications considered and the decisions made.

For research that is deemed to fall under Research Category A (low ethical risk), a favourable outcome at the relevant Filter Committee will be sufficient to secure ethical approval. Research falling under the other two categories must however be considered by the Ethics Committee before approval may be granted.

On the basis of this review, four key outcomes may arise:

1. Research proposal approved (no recommendations)
2. Research proposal approved pending minor revisions (to be accepted by the Chair and Research Supervisor)
3. Research proposal approved pending major revisions (to be resubmitted and approved by the Ethics Committee)
4. Research proposal rejected (resubmission necessary)

A summary of the processes involved in applying for ethical approval can be seen in Figure 2.

Appeals
Appeals against the Committee’s decision may be made within ten working days. In this case, at least three members of the Ethics Committee, none of whom will have reviewed the initial application, may review this along with any additional information submitted by the applicant.
Figure 2: Process chart for seeking Ethical Approval
**Ethics Application Checklist**

To be submitted alongside the ethics application.

Please complete the below checklist, ticking each item to confirm that it has been addressed.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I agree to obtain informed written consent from all human participants aged over 18 who are involved in this research (or if circulating digitally, I will ensure that informed consent is completed, and will have the participants indicate their informed consent by continuing with their study engagement).</td>
</tr>
<tr>
<td>2.</td>
<td>I agree to obtain informed written consent from the parents of anyone aged under 18 in this research (or from the schools if appropriate), and informed written assent from those under 18 in this research.</td>
</tr>
<tr>
<td>3.</td>
<td>I include a letter of agreement from a clinically responsible individual agreeing to (where appropriate) help me recruit/provide clinical support in the event that participants become distressed/host the study data collection.</td>
</tr>
<tr>
<td>4.</td>
<td>I append a letter of agreement from an external institution or organisation agreeing to host the study.</td>
</tr>
<tr>
<td>5.</td>
<td>I agree to comply with NCI’s Data Retention Policy.</td>
</tr>
<tr>
<td>6.</td>
<td>I have appended a) information sheet, b) consent form/assent form, c) debriefing sheet.</td>
</tr>
<tr>
<td>7.</td>
<td>I have provided details of how non-anonymised data will be stored, in a safe and encrypted manner.</td>
</tr>
<tr>
<td>8.</td>
<td>I have included my contact details and those of my supervisor (where appropriate). I have only included my NCI email address and not included any personal contact information.</td>
</tr>
<tr>
<td>9.</td>
<td>I have given sufficient details on the proposed study design, methodology, and data collection procedures, to allow a full ethical review, and I understand that my failure to give sufficient detail may result in a resubmission being required.</td>
</tr>
<tr>
<td>10.</td>
<td>I understand that if I make changes to my study following ethical approval, it is my responsibility to seek an ethics amendment if the change merits ethical consideration.</td>
</tr>
</tbody>
</table>
National College of Ireland

Human Participants Ethical Review Application Form

All parts of the below form must be completed. However, in certain cases where sections are not relevant to the proposed study, clearly mark NA in the box provided.

<table>
<thead>
<tr>
<th>Part A: Title of Project and Contact Information</th>
</tr>
</thead>
</table>

**Name**

**Student Number (if applicable)**

**Email**

**Status:**
- Undergraduate
- Postgraduate
- Staff

**Supervisor (if applicable)**

**Title of Research Project**

**Category into which the proposed research falls (see guidelines)**
- Research Category A
- Research Category B
- Research Category C

**Have you read the NCI Ethical Guidelines for Research with Human Participants?**
- Yes
- No

**Please indicate any other ethical guidelines or codes of conduct you have consulted**

**Has this research been submitted to any other research ethics committee?**
- Yes
- No
If yes please provide details, and the outcomes of this process, if applicable:

Is this research supported by any form of research funding?

Yes □
No □

If yes please provide details, and indicate whether any restrictions exist on the freedom of the researcher to publish the results:

Part B: Research Proposal

Briefly outline the following information (not more than 200 words in any section).

Proposed starting date and duration of project

The rationale for the project

The research aims and objectives

The research design

The research sample and sample size
Please indicate the sample size and your justification of this sample size. Describe the age range of participants, and whether they belong to medical groups (those currently receiving medical treatment, those not in remission from previous medical treatment, those recruited because of a
previous medical condition, healthy controls recruited for a medical study) or clinical groups (those undergoing non-medical treatment such as counselling, psychoanalysis, in treatment centres, rehabilitation centres, or similar, or those with a DSM disorder diagnosis).

If the study involves a MEDICAL or CLINICAL group, the following details are required:

a) Do you have approval from a hospital/medical/specialist ethics committee?
   If YES, please append the letter of approval. Also required is a letter from a clinically responsible authority at the host institution, supporting the study, detailing the support mechanisms in place for individuals who may become distressed as a result of participating in the study, and the potential risk to participants.
   If NO, please detail why this approval cannot or has not been sought.

b) Does the study impact on participant’s medical condition, wellbeing, or health?
   If YES, please append a letter of approval from a specialist ethics committee.
   If NO, please give a detailed explanation about why you do not expect there to be an impact on medical condition, wellbeing, or health.

The nature of any proposed pilot study. Pilot studies are usually required if a) a new intervention is being used, b) a new questionnaire, scale or item is being used, or c) established interventions or questionnaires, scales or items are being used on a new population. If no such study is planned, explain why it is not necessary.

The methods of data analysis. Give details here of the analytic process (e.g. the statistical procedures planned if quantitative, and the approach taken if qualitative. It is not sufficient to name the software to be used).

Study Procedure
Please give as detailed an account as possible of a participant’s likely experience in engaging with the study, from point of first learning about the study, to study completion. State how long project participation is likely to take, and whether participants will be offered breaks. Please attach all questionnaires, interview schedules, scales, surveys, and demographic questions, etc. in the Appendix.
Part C: Ethical Risk

Please identify any ethical issues or risks of harm or distress which may arise during the proposed research, and how you will address this risk. Here you need to consider the potential for physical risk, social risk (i.e. loss of social status, privacy, or reputation), outside of that expected in everyday life, and whether the participant is likely to feel distress as a result of taking part in the study. **Debriefing sheets must be included in the appendix if required.** These should detail the participant’s right to withdraw from the study, the statutory limits upon confidentiality, and the obligations of the researcher in relation to Freedom of Information legislation. Debriefing sheets should also include details of helplines and avenues for receiving support in the event that participants become distressed as a result of their involvement in this study.

Do the participants belong to any of the following vulnerable groups?  
(Please tick all those involved).

- [ ] Children;
- [ ] The older old (85+);
- [ ] People with an intellectual or learning disability
- [ ] Individuals or groups receiving help through the voluntary sector
- [ ] Those in a subordinate position to the researchers such as employees
- [ ] Other groups who might not understand the research and consent process
- [ ] Other vulnerable groups

How will the research participants in this study be selected, approached and recruited? From where will participants be recruited? If recruiting via an institution or organisation other than NCI please attach a letter of agreement from the host institution agreeing to host the study and circulate recruitment advertisements/email etc.

What inclusion or exclusion criteria will be used?

How will participants be informed of the nature of the study and participation?

Does the study involve deception or the withholding of information? If so, provide justification for this decision.
What procedures will be used to document the participants’ consent to participate?

Can study participants withdraw at any time without penalty? If so, how will this be communicated to participants?

If vulnerable groups are participating, what special arrangements will be made to deal with issues of informed consent/assent?

*Please include copies of any information letters, debriefing sheets, and consent forms with the application.*

<table>
<thead>
<tr>
<th>Part D: Confidentiality and Data Protection</th>
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<table>
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<tr>
<th>Please indicate the form in which the data will be collected.</th>
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</thead>
<tbody>
<tr>
<td>□ Identified □ Potentially Identifiable □ De-Identified</td>
</tr>
</tbody>
</table>

What arrangements are in place to ensure that the identity of participants is protected?

Will any information about illegal behaviours be collected as part of the research process? If so, detail your consideration of how this information will be treated.

Please indicate any recording devices being used to collect data (e.g. audio/video).

Please describe the procedures for securing specific permission for the use of these recording devices in advance.

<table>
<thead>
<tr>
<th>Please indicate the form in which the data will be stored.</th>
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<tbody>
<tr>
<td>□ Identified □ Potentially Identifiable □ De-Identified</td>
</tr>
</tbody>
</table>
Who will have responsibility for the data generated by the research?

Is there a possibility that the data will be archived for secondary data analysis? If so, has this been included in the informed consent process? Also include information on how and where the data will be stored for secondary analytic purposes.

If not to be stored for secondary data analysis, will the data be stored for 5 years and then destroyed, in accordance with NCI policy?

☐ Yes  □ No

Dissemination and Reporting

Please describe how the participants will be informed of dissemination and reporting (e.g. submission for examination, reporting, publications, presentations)?

If any dissemination entails the use of audio, video and/or photographic records (including direct quotes), please describe how participants will be informed of this in advance.

Part E: Signed Declaration

I confirm that I have read the NCI Ethical Guidelines for Research with Human Participants, and agree to abide by them in conducting this research. I also confirm that the information provided on this form is correct (Electronic signature is acceptable).

Signature of Applicant ___

Date ___________

Signature of Supervisor (where appropriate):

Date ________________

Any other information the committee should be aware of?
1. Introduction

Secondary data refers to data that is collected by someone other than the current researcher. Common sources of secondary data for social science include censuses, information collected by government departments, organizational records and data originally collected for other research purposes. Primary data, by contrast, is collected by the investigator conducting the research.

A project that does not involve human participants requires ONLY completion of Declaration of Ethics Consideration Form and submission of the form on module’s Moodle page.

A project that involves human participants requires ethical clearance and an Ethics Application Form must be submitted through the module’s Moodle page. Please refer to and ensure compliance with the ethical principles stated in NCI Ethics Form available on the Moodle page.
The following decision table will assist you in deciding if you have to complete the Declaration of Ethics Consideration Form or/and the Ethics Application Form.

| Public Data | Y | Y | Y | Y | N | N | N | N |
| Private Data | Y | Y | N | N | Y | Y | N | N |
| Human Participants | Y | N | Y | N | Y | N | Y | N |
| Declaration of Ethics Consideration Form | x | X | x | X | X | X |
| Ethics Application Form | X | X | X | X |

Please circle (or highlight) as appropriate

| The project makes use of secondary dataset(s) created by the researcher | Yes / No |
| The project makes use of public secondary dataset(s) | Yes / No |
| The project makes use of non-public secondary dataset(s) | Yes / No |
| Approval letter from non-public secondary dataset(s) owner received | Yes / No |

2. Sources of Data:

*It is students’ responsibility to ensure that they have the correct permissions/authorizations to use any data in a study. Projects that make use of data that does not have authorization to be used, will not be graded for that portion of the study that makes use of such data.*

**Public Data**

A project that makes use of public secondary dataset(s) **does not need ethics permission**, but **needs a letter/email from the copyright holder** regarding potential use.

Some websites and data sources allow their data sets to be used under certain conditions. In these cases, a letter/email from the copyright holder is NOT necessary, but the researcher should cite the source of this permission and indicate under what conditions the data are allowed to be used. See Appendix I for examples of permissions granted by Fingal Open Data, and Eurostat website.

Where websites or data sources indicate that they do not grant permission for data to be used, you will still need a letter/email from the copyright holder. For example, see Appendix II for an example from the Journal of Statistics Education.

**Private Data**
A project that makes use of non-public (private) secondary dataset(s) must receive data usage permission from School of Computing.

An approval letter/email from the owner (e.g. institution, company, etc.) of the non-public secondary dataset must be attached to the Declaration of Ethics Consideration. The letter/email must confirm that the dataset is anonymised and permission for data processing, analysis and public dissemination is granted.

**Evidence for use of secondary dataset(s)**

Include dataset(s) owner letter/email or cite the source for usage permission

<table>
<thead>
<tr>
<th>3. CHECKLIST</th>
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<tbody>
<tr>
<td><strong>Non-public/private secondary dataset(s)</strong> - Owner letter/email is attached to this form</td>
</tr>
<tr>
<td><strong>OR</strong></td>
</tr>
<tr>
<td>Citation and link to the web site where permission is granted – provided in this form</td>
</tr>
</tbody>
</table>
ETHICS CLEARANCE GUIDELINES WHEN HUMAN PARTICIPANTS ARE INVOLVED

The Ethics Application Form must be submitted on Moodle for approval prior to conducting the work.

Considerations in data collection

- Participants will not be identified, directly or through identifiers linked to the subjects in any reports produced by the study
- Responses will not place the participants at risk of professional liability or be damaging to the participants’ financial standing, employability or reputation
- No confidential data will be used for personal advantage or that of a third party

Informed consent

- Consent to participate in the study has been given freely by the participants
- Participants have the capacity to understand the project goals.
- Participants have been given information sheets that are understandable
- Likely benefits of the project itself have been explained to potential participants
- Risks and benefits of the project have been explained to potential participants
- Participants have been assured they will not suffer physical stress or discomfort or psychological or mental stress
- The participant has been assured s/he may withdraw at any time from the study without loss of benefit or penalty
- Special care has been taken where participants are unable to consent for themselves (e.g. children under the age of 18, elders with age 85+, people with intellectual or learning disability, individuals or groups receiving help through the voluntary sector, those in a subordinate position to the researcher, groups who do not understand the consent and research process)
- Participants have been informed of potential conflict of interest issues
• The onus is on the researcher to inform participants if deception methods have to be used in a line of research

I have read, understood, and will adhere to the ethical principles described above in the conduct of the project work.

Signature :

Date :
4. Appendix I

1) Fingal Open Data: http://data.fingal.ie/About

Licence
Citizens are free to access and use this data as they wish, free of charge, in accordance with the Creative Commons Attribution 4.0 International License (CC-BY).

Note: From November 2010 to July 2015, data on Fingal Open Data was published in accordance with the PSI general licence.

Use of any published data is subject to Data Protection legislation.

Licence Statement
Under the CC-BY Licence, users must acknowledge the source of the Information in their product or application by including or linking to this attribution statement: “Contains Fingal County Council Data licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) licence”.

Multiple Attributions
If using data from several Information Providers and listing multiple attributions is not practical in a product or application, users may include a URI or hyperlink to a resource that contains the required attribution statements.

2) Eurostat: https://ec.europa.eu/eurostat/about/policies/copyright
COPYRIGHT NOTICE AND FREE RE-USE OF DATA

Eurostat has a policy of encouraging free re-use of its data, both for non-commercial and commercial purposes. All statistical data, metadata, content of web pages or other dissemination tools, official publications and other documents published on its website, with the exceptions listed below, can be reused without any payment or written licence provided that:

- the source is indicated as Eurostat
- when re-use involves modifications to the data or text, this must be stated clearly to the end user of the information

5. Appendix II


JSE Copyright and Usage Policy

Unlike other American Statistical Association journals, the Journal of Statistics Education (JSE) does not require authors to transfer copyright for the published material to JSE. Authors maintain copyright of published material. Because copyright is not transferred from the author, permission to use materials published by JSE remains with the author. Therefore, to use published material from a JSE article the requesting person must get approval from the author.