

# **Minor Thesis Guidelines for the degrees of Master of Engineering Science (Coursework and Minor Thesis) Master of Engineering Science in Process Integration, Master of Telecommunication Engineering, Master of Biomedical Engineering and Master of Maintenance and Reliability Engineering.**

## **Introduction**

The Master of Engineering Science (Coursework and Minor Thesis) and Master of Engineering Maintenance Management are primarily coursework degrees with a minor thesis component which normally contributes 25% of the overall points value for the degrees ((18 cp out of 72 cp). The Master of Engineering Science in Process Integration thesis is worth one third of the value of the total requirement for the degree (24 out of 72cp). For the Masters of Telecommunication and Biomedical Engineering, the thesis component comprises 50% of the course requirement (24 out of 48 cp). The size of the thesis and the nature of research contributing to its content will therefore not be comparable to Masters done purely by research. These guidelines are intended to describe the aims and objectives of the research project leading to the thesis, the process of development of the project, its approval, supervision implementation, documentation and assessment.

The project written up in a minor thesis is carried out under the supervision of a member of staff of the University. It may involve, for example, an experimental or theoretical research problem, a design or computational exercise, an industrial problem or the design and construction of an experimental facility within the department or school. The candidate is generally encouraged to select a project in an area associated with his or her employment. Assistance in this selection is given by members of the department or school in which the study is being undertaken. The candidate relies upon the supervisor to assist in laying down the broad outlines of the project since, in the early stages at least, the candidate's experience is likely to be rather limited. Topic approval, supervision and assessment is the responsibility of the Graduate Affairs Committee of the Faculty.

## **Aims**

The broad aims of the thesis component are to enable candidates to:

- plan, organise and carry out an investigation, including a literature review where relevant, under general supervision but without detailed direction;
- to marshal information and to express it coherently in a scholarly report; and
- to exercise critical judgement and intellectual honesty in reporting the results

## **Objectives**

Upon completion of the thesis the candidate should have demonstrated an ability to:

- Select and justify an issue of relevance and importance to engineering practice in the field of study.
- Carry out a critical review of the published literature grasping its strengths and weaknesses and problems in methodology and analysis
- Select, justify and describe an appropriate research design.
- Select and justify appropriate methods of data collection and data analysis.
- Prepare a proposal capable of meeting the standards required of a minor thesis.
- Demonstrate skills in interpreting data in the light of relevant literature.
- Demonstrate skills in writing up the research project in the form of a scholarly minor thesis 100-200 pages in length in which the relevance of the results obtained to engineering practice in the field of study are highlighted.

## **Topic Selection**

Students are encouraged to give serious consideration to their research topic at the time of commencement of the Masters course. It may take several months to finalise the choice of topic and it will usually take at least 18 months from the commencement of the thesis until submission. Whatever the choice of topic, it must be one that students are primarily interested in rather than one which is imposed upon them by a supervisor or other interested party.

## **Assistance with topic choice**

A supervisor should be appointed at the commencement of the Masters program or at the commencement of the thesis component. Students are encouraged to contact their supervisor at the earliest possible opportunity to facilitate the process of topic selection.

## **Responsibility of the Supervisor**

It is the responsibility of supervisors to maintain a professional relationship at all times with the student and to:

- Give guidance about the nature of the thesis and the standard expected, about the choice of topic, about the planning and presentation of the thesis proposal, about literature and sources and about required research procedures;
- Give detailed advice on the necessary completion dates of successive stages of work so that the whole may be submitted within the scheduled time;
- Encourage the candidate to show initiative and self motivation so he/she will be able to pursue independent research with confidence in the final stages of candidature;
- Establish and maintain a schedule of regular (at least monthly) meetings or communication with the candidate in accordance with faculty/departmental policy and in the light of discussion of arrangements with the candidate;
- Recognise the importance of requesting regular written work, interim reports or research results as appropriate and to return such work, including the final draft of the thesis, with constructive criticism normally within one month at most or within a shorter time frame which has been determined as appropriate within the department or school;
- Ensure that where a change in research direction occurs, appropriate supervisory adjustments are negotiated;
- Ensure that the candidate is adequately trained in safe working practices relevant to the field of research and adheres to the guidelines established by the university's Occupational Health and Safety Policy Committee and as adopted by Council;
- Ensure that the candidate plays a full and active role in the intellectual life of the department. This is particularly important in the case of part-time candidature and also for those candidates whose major work is being conducted away from the university department or in a joint project with a commercial or industrial partner;
- Ensure that the work reported in the thesis is the student's own, except where due reference is made in the text of the thesis, and that any editorial assistance in the writing of the thesis is appropriately acknowledged;
- Ensure the direction of the work is entirely under the control of the university and candidate in accordance with university policy;
- Ensure adherence to the university policy and guidelines on intellectual property;
- Ensure that the candidate is made aware of the standard of work that is generally expected;
- Ensure that the candidate is made aware of inadequate progress by specifying the problems and suggesting ways of addressing them.
- Advise the head of department/school or dean of the names of possible examiners, after consultation with the candidate;

- Ensure that original data is recorded in a retrievable, durable and appropriately referenced form and is stored safely for a period appropriate to the discipline, but in any case not less than five (5) years.

### **Responsibilities of the student**

It is the responsibility of the candidate to maintain a professional relationship at all times with the supervisor and other university staff and to:

- Utilise the resources, facilities and opportunities available to facilitate progress in the research;
- Contribute to the development of the intellectual community provided by the department or school, and acquire or improve the skills and knowledge required for the completion of the project;
- Ensure that original data is recorded in a retrievable, durable and appropriately referenced form and stored safely for a period appropriate to the discipline, but in any case not less than 5 years;
- Initiate discussion with the supervisor on the type of guidance and comment considered most helpful, and agree to a schedule of meetings which will ensure regular contact;
- Take the initiative in raising problems or difficulties, and seek solutions to these problems;
- Document the progress of the work as agreed with the supervisor, and present written or other material as required, in sufficient time to allow for comments and discussions before proceeding to the next stage;
- Prepare the thesis for examination, including arrangements for its typing, proof reading, and binding after consulting with the supervisor, as appropriate, regarding matters of style and presentation.

### **Thesis enrolment**

For enrolment purposes, a minor thesis is weighted according to the percentage amount it contributes to the course as a whole. For the Master of Engineering Science (Cwk & Minor Thesis) and the Master of Maintenance and Reliability Engineering, the total enrolment in the minor thesis will be worth 25% of the course which is expressed as a weighting of 0.375 EFTSU (33% or 0.5 EFTSU for Process Integration) (Equivalent Full-time Student Unit). This weighting is calculated on the basis that the degrees are 18 month (equivalent) full-time courses (although Regulations allow for completion within 54 months) and therefore attract a load of 1.5 EFTSU overall. For the Telecommunication and Biomedical Engineering Masters degrees the thesis is worth 50% or 0.5 EFTSU. These courses attract a load of 1 EFTSU.

It is Faculty policy that all candidates enrolling in their thesis must enrol in at least a third of the total weighting of the thesis in any semester that the candidate is working on the thesis. Therefore, if a student wishes to complete the thesis in 12 months the standard enrolment would be a third in semester one and two thirds in semester two. These are the only acceptable levels of enrolment in the thesis in any semester except in the case of Telecommunication or Biomedical Engineering where candidates are likely to complete the thesis in one semester if studying full-time. Should the candidate not complete the thesis after enrolling in the total weighting of the thesis (and provided his candidature submission date has not expired), any further enrolment in the thesis must still be at the required level of one third of the value of the thesis in any semester of enrolment. This requirement is strictly enforced to encourage students to submit in minimum time.

### **Thesis content**

Research undertaken in preparation for a minor thesis should be original and essentially independent but supervised.

The responsibility for the layout of the thesis and selection of the title rests with the candidate after discussion with the supervisor. The candidate should state generally in the preface and bibliography, and specifically in footnotes, the sources of the information and the extent to which the thesis draws on the work of others. Full and appropriate attribution is essential. The student should also state on the title page or the thesis, the proportion of the total requirement for the degree, as prescribed by the Faculty, which the thesis represents (normally 25%).

Candidates should be wary of setting unachievable research goals. This is a minor thesis and research is to be carried out in a limited time frame with limited resources. Although the research itself should be thorough, well planned, well structured and professionally executed, it must seek to answer questions which require a short (3-6 month) data collection phase. Anything longer than this will result in difficulties in completing the thesis in the available time.

### **Thesis literature review**

A brief summary of the literature should accompany the research proposal. Students are expected to critically appraise the references and research undertaken in the area of study. The literature review could be up to 15-20 pages in length and should contain about 50 references. Shortcomings of the literature may need to be highlighted. Students should keep up to date with the literature in their chosen area of research and add to the literature review during the final stages of writing up the thesis.

### **Thesis writing guidelines**

The word length of the thesis does not include footnotes, references or appendices, nor does it include equations, tables, diagrams and other illustrations. It is expected that minor theses generally do not exceed 35,000 words. It is essential that students follow a set referencing style in writing up their thesis. The thesis should be written in the past tense and in the third person. It is important to maintain consistency of style throughout.

### ***Typing***

Typing and binding of the thesis is the responsibility of the candidate. It is preferred that the typing be double spaced through one and half spacing is acceptable. It is recommended that a font not smaller than 10 point be used for the main text. A thesis should be typed on any one of the recognised sizes of 'quarto' paper, namely, International A4, American Quarto or Imperial Quarto. Both sides of the paper may be used, at the discretion of the candidate, provided the result is clear, legible and tidy. If both sides are used, special care must be taken in the placing of margins. Margins should not be less than 4 centimetres on the binding edge and 1.5 centimetres on the other outer edges to allow for binding and trimming.

Using the preceding guidelines, a minor thesis of 35,000 words presented in a 12 point font and double spaced would be approximately 140 pages in length. Using the same font and one and a half spacing would bring the page length to 105 pages. When a 10 point font is used in conjunction with double spacing, the thesis would be about 80 pages in length. If the spacing were then reduced to one and a half, the overall length would be reduced to 70 pages.

The thesis should incorporate in the following order:

- Title page, giving the title of the thesis in full, the names and the degrees of the candidate, the name of the department or academic unit of the university associated with the work and the date when the thesis is submitted for the degree;
- Table of contents;
- Summary (abstract) of not more than 500 words;

- A signed statement to the effect that the thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other institution and affirms that to the best of the candidate's knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.
- An acknowledgment of any help given or work carried out by another person or organisation;
- The main text;
- Appendices, if any;
- References (if not included in the text) and/or bibliography.

### ***Bibliographical details***

Books should include full citation, as follows:

Name(s) of authors (surname and initials); title of book; edition (if relevant); place of publication; publisher and year of publication. Where necessary, the relevant pages should be cited. Where particular disciplines have their own conventions, these may be followed.

If a reference has many authors, the first only should be cited followed by et al to indicate that there are others. Citations of articles in periodicals should follow the rules of citation adopted by one or other of the leading journals in the relevant field or discipline. Whichever format is adopted should then be used consistently throughout the thesis. The bibliography may also be sub-divided according to the scholarly conventions in a particular discipline, but authors' surnames should be set out in alphabetical order.

Candidates may find one or other of the following publications of some help:

Australian Government Publishing Services (AGPS), Style manual for authors, editors and printers, 5<sup>th</sup> edition, AGPS, Canberra, 1996.

Mullins, CJ, The complete manuscript preparation style guide, Englewood Cliffs, NJ, 1982.

Turabian, KL, A manual for writers of term papers, theses and publications, 6<sup>th</sup> revised edition, University of Chicago Press, Chicago, 1996.

For guides to specific subject areas, inquire either through the appropriate branch library, or appropriate department/academic unit.

### ***Diagrams and figures***

The following are general suggestions for normal practice:

- Diagrams and figures, etc. should be photocopied on to A4 paper and bound in the appropriate place in the text.
- Figures should form a right-hand page with the legend either at the bottom or, if necessary, on the page facing the figures.
- Alternatively, when appropriate, figures may be interspersed throughout the text, as in books or journals. If computer produced graphics are used, the quality and resolution must be equal to that obtained by photographic reproduction.
- Tables should be inserted in the appropriate place in the text, except that lengthy or bulky tables should appear as an appendix.
- Diagrams, maps, tables, etc, exceeding A4 size, should be folded so as to read as a right hand page when open.
- Assistance in the preparation of diagrams, charts and photographs may be given by the university at the discretion of the head of the department or academic unit concerned.

### ***Binding***

After the examination process has been completed, four copies of thesis must be sewn and bound with stiff covers covered with cloth. (A loose-leaf binder of the spring-type or screw-type is not acceptable). During bind the edges should be trimmed. On the spine of the thesis should be – in gold lettering of suitable size, reading from top to bottom-the surname of the candidate, the title of the thesis, abbreviated if necessary, the words “minor thesis” and the year of submission. The choice of the colour of the thesis binding is made by the candidate, though care should be taken to ensure the legibility of the gold lettering on the spine.

## **Submission of theses and examination**

### ***Submission***

Three spiral or thermal-bound copies of the thesis must be submitted to the Manager (Graduate Student Services) in the Faculty Office. The Faculty Office is located on the ground floor of building 72, Clayton campus and is open between 9 am and 5 pm each weekday. Before the degree can be awarded, four hard-bound copies must be submitted for distribution after the examination process has been completed. When the thesis is submitted, the candidate is issued with a form recording the date of submission and other particulars.

### ***Library consent***

The copies of the thesis after examination are distributed as follows:

- Copy to the university library;
- Copy to the department or academic unit;
- Copy to the supervisor;
- Copy to the candidate

The copy lodged in the university library may be made available by the university to any person for consultation and photocopying, provided that for a period of three years after the thesis is lodged it shall not be made available without the written consent of the author.

Accordingly after the degree has been awarded, the candidate is asked to sign a certificate of consent which reads:

- I agree/do not agree that this thesis may be made available for consultation within the university.
- I agree/do not agree that the thesis may be made available for photocopying.
- I note that my consent is required only to cover the three-year period following approval of my thesis for the award of my degree.

Provision nevertheless exists for access to a thesis to be restricted for periods longer than three years if the Faculty is convinced the circumstances warrant such action.

## **Process of examination**

### ***Appointment of examiners***

It is advisable for the names of two examiners, one who is external to the department or school concerned, to be forwarded by the department or school to the Manager (Graduate Student Services) at least four weeks before the thesis is submitted.

It is expected that as a matter of normal practice, the head of department or school will first consult with the supervisor, with regard to the names of possible examiners. Candidates should be invited to name individuals whom they do not wish appointed as examiners. After considering the recommendation of the head of the department or school, the Graduate and Further Education Committee appoints two examiners.

Choice of examiners is made with regard to their knowledge and standing in the field of study involved, but qualities such as reputation and experience in thesis examining should not be overlooked. As a general rule, an examiner should possess at least a Masters degree in the area of study. A person who has had involvement in the student's research, should not be nominated. Experience here and elsewhere suggest that speediness in completing the examination and submission of report, clarity of the examiner's report, and a reasonable expectation about the standard required of a minor thesis, are important qualities to seek in potential examiners, in addition to their scholarly standing.

It is especially advisable for both examiners to be asked informally before the thesis is submitted whether they are willing to examine. It is also appropriate at this stage to ask whether an examiner would be able to complete the examination within six to eight weeks from the estimated date of receipt of the thesis. In nominating examiners the head of department or academic unit should be able to indicate that they have agreed to act, so that the examination may proceed without delay as soon as the thesis is submitted.

If a candidate believes that the appointment of a particular examiner may be prejudicial to the fair examination of the thesis, the candidate may so inform the Faculty giving reasons, at any stage during candidature. Such an action, however, should not be taken without prior discussion by the candidate with both the supervisor and the head of department or school.

Two of the three thesis copies are despatched to examiners when all documentation related to the submission of the thesis have been completed. Thesis copies are despatched by certified mail to examiners in Australia and by air mail to examiners overseas.

On being invited to review a thesis, examiners are given a deadline for reporting. Examiners located in Australia are given six weeks from the date of the invitation letter to complete their reports and examiners based overseas are given eight weeks. Examiners are also requested to contact the branch if they anticipate a delay in submitting a report beyond the given deadline. When received, this information is passed on to the candidate.

If a report is not received by the deadline indicated in the invitation letter, a reminder is sent. This may be sent by mail, facsimile or e-mail. The most common causes of delays are the excessive workload or the travelling commitments of the examiner.

If the examiners are not unanimous in passing a thesis, further time may be spent for example, in seeking a recommendation from an Advisory panel. In the circumstances candidates should not expect a rapid notification of the result. The candidate is cautioned that the examiners cannot be contacted for any reason during the examination process. Any correspondence must be sent through the Faculty. Supervisors are also cautioned not to contact the examiners with regard to a particular examination.

Examiners are provided with notes for the examination of a minor thesis. They are requested to complete a form indicating whether the candidate has met certain listed criteria, to recommend a particular examination outcome and provide a report.

The thesis is forwarded to an examiner in confidence. An examiner is under an obligation to maintain confidentiality and in no circumstances should he/she discuss the thesis or any part of the examination process, with a third party, without the prior approval of the Graduate and Further Education Committee. Each examiner is asked to indicate whether the candidate has demonstrated an ability to:

- Plan, organise and carry out investigation including a literature review where relevant, under general supervision but without detailed direction
- Marshal information and to express it coherently in a scholarly report
- Exercise critical judgement and intellectual honesty in report the results

Examiners may annotate a thesis copy lightly in pencil.

There are five possible recommendations that an examiner can make on a minor thesis. These are:

- The candidate's minor thesis be acceptable in partial satisfaction of the degree requirement without further examination
- The candidate's minor thesis be accepted in partial satisfaction of the degree requirement without further examination subject to the insertion in all copies of the thesis, minor amendments as indicated by the examiner
- The candidate's minor thesis be accepted in partial satisfaction of the degree requirement subject to a satisfactory performance in an oral examination dealing with the subject matter of the thesis or matters nominated by the examiner as relevant to the thesis
- The candidate's minor thesis be not yet accepted in partial satisfaction of the degree requirements, but that the candidate be permitted to resubmit the thesis in a revised form.
- The candidate's minor thesis be not accepted in partial satisfaction of the degree requirements.

The examiner is also expected, whether the report is favourable or unfavourable, to provide some detailed comments on the strengths and/or weaknesses of the thesis.

Where both examiners have recommended a pass or amendments or a combination of pass and amendments, a decision to recommend minor amendment or the award of the degree will be made by the Graduate and Further Education Committee. A result may be issued to the candidate and department once this decision has been made.

In the case of minor amendments, candidates and departments are advised if minor amendments are required and requested to collect all the thesis copies from the Faculty. Amendments must be made to all available copies of the thesis. When the amended copies are received by the Faculty, together with the form certifying that amendments have been completed to the satisfaction of the head of department, then the award of degree cannot be made until the examiner has approved the amendments.

Where there is a significant difference between the recommendations of the two examiners or where both examiners have recommended revision and resubmission of the thesis, then an advisory panel will be convened. Candidates are issued with copies of the examiners' reports upon the receipt of both reports. They are strongly advised to contact their supervisors to discuss the contents of the examiners' report. The Advisory panel will make a recommendation to the Graduate and Further Committee who will act on the recommendation.

Where a revise and resubmit recommendation is made by the panel, it is required to specify the date by which the revised thesis is to be submitted. A candidate will normally be given no more than six months to revise the thesis. Advisory panel members should differentiate quite unequivocally between revise and resubmit on the one hand and minor substantial amendments on the other. In the case of the latter, the candidate is not required to re-enrol but to undertake amendments to the satisfaction of the head of department or school and/or dissenting examiner. When a candidate is advised to revise and resubmit, all

copies submitted to the Faculty must be revised. The candidate is also required to re-enrol which will result in a HECS liability. The panel may, where it seems appropriate, recommend examiners for a revised and resubmitted thesis.

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(Revised 4 September 2001)