



The University of the West Indies
Department of Electrical and Computer Engineering

Course Manual

for

MASc Project

<http://www.eng.uwi.tt/depts/elec/pgrad/project.php>

ECNG 6021/6022/6023

The University of the West Indies
Department of Electrical and Computer Engineering

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1. To the Student

The student in MASc Project stage is responsible for the gathering, assimilation, understanding and application of knowledge and data required for the project. The student manages and controls the progress of his/her project and its outcome. The student is reminded that the project supervisor is simply there to accumulate information on student performance and project progress (so that fair and accurate grades may be assigned) and to provide technical guidance, inspiration and at times counseling. The project phase carries twelve (12) credits and hence the time spent on it should be equivalent to four (4), three (3) credit courses of the taught component of the MASc programme. This gives the student a guide of the level of the research and the quality of the report expected. The outcomes of the project include:

- Formulation of creative solutions to engineering problems.
- Engineering analysis and enquiry.
- Validation and testing against benchmarks.
- Project management: concept development, planning, implementation and testing.
- Time management: plan for unforeseen events, setting realistic goals.
- Communication skills: writing technical reports, making professional presentations.

It is expected that the student will bring to bear the breadth of knowledge gathered over the courses of previous years. However, it is not unusual for a project to require a student to rely on a body of knowledge outside of that taught in the programme or, as has been the case on occasions, completely outside of Electrical and Computer Engineering. The MASc Project can therefore be seen as a forum as well as an opportunity to build up and expand on the core of learning gained. As such, the department will ensure that all projects are of a challenging nature. It is our view that only by meeting and exceeding these challenges that students will be better prepared to face the very real challenges of the engineering profession.

1.1 Access to Postgraduate Portal

To gain access to the Postgraduate Portal, students must send an email to the Postgraduate Secretary secpgm.dece@sta.uwi.edu with the following information:

- a. Name
- b. Student ID
- c. Telephone number
- d. Student UWI email address

2. Purpose of the Course

2.1 Aims and Goals

To develop competence in the conceptualisation, design, implementation and verification of solutions to engineering problems and in the analysis and enquiry into problems at the engineering application level.

2.2 Objectives

The objective of the project is to assist student's development through the application of their technical knowledge to the solution of practical problems in engineering processes and systems.

At the end of the MASc Project the student should be able to:

1. Clearly formulate a problem specification which embodies the original definition of the project.
2. Demonstrate an acceptable level of expertise in planning and managing a project.
3. Demonstrate an acceptable level of capability in devising and implementing creative solutions.
4. Demonstrate acceptable level of competence in technical writing.

3. Prerequisites

A student enrolled in this course should have passed all the prescribed written courses at the MASc level and therefore would have accumulated 24 approved postgraduate credits. Such a student would be eligible for the award of a postgraduate Diploma if the student so desires.

4. Detailed Description of the Project Phases

4.1 Registration Process

Students who have completed the taught course requirements and are approved to proceed to the project phase MUST register for the following courses as appropriate:

ECNG6021 MASc Research I:	4 credits
Followed by	
ECNG6022 MASc Research II:	0 credits
Followed by	
ECNG6023 MASc Project:	8 credits

Each course should be completed in one semester and registration can commence in any semester. ECNG6021 is offered on a PASS/FAIL basis. Students are expected to submit their report for each phase to the MASc Coordinator for examination at the end of the semester in which they registered for the particular phase and will receive a receipt. Students making substantial progress in their work may be allowed to register for ECNG6022 and ECNG6023 simultaneously.

In summary, possible course registration sequences are:

ECNG6021 → ECNG6022 → ECNG6023
ECNG6021 → ECNG6022 + ECNG6023 (accelerated path)

4.2 Completion in Semester III

Full time students who wish to complete the research project during Semester III shall consult with the MASc Coordinator before the completion of Semester II to ensure the research project (supervision and assessment) can be accommodated before completing the registration process for Semester III.

4.3 Project Selection

Lecturers often post MASc projects at the beginning of each academic year. This list is to be made available to MASc students on the MASc Project Portal <http://www.eng.uwi.tt/depts/elec/pgrad/MAScProject/index.php>. Students are strongly encouraged to engage in discussion with the potential project supervisors exploring project possibilities, as early as the semester prior to registration of ECNG6021.

Project ideas and proposals can be submitted through the MASc portal for review by the Postgraduate Coordinator

and project supervisor. Students are advised to choose a project supervisor aligned with area of research and expertise.

4.4 Examination of Project Phase Components

First and second examiners for each student project will be appointed by the Department immediately following the submission and approval of the project proposal. The project supervisor will automatically be appointed as the first examiner with the second examiner being appointed by the Programme Coordinator. The second examiner is usually a member of the Department's academic staff but qualified persons from outside the department may also be appointed to this role. The examination of the report will be based on the indicators provided in the template.

Students in ECNG6021 and ECNG6023 will be examined by the first and second examiner by way of a report submitted by the student. Evaluation of ECNG6023 may include a demonstration, report presentation and oral examination led by a panel comprising the first examiner, second examiner and a moderator (appointed by the Programme Coordinator). The duration of the examination will be forty-five (45) minutes with students presenting their work in the first twenty (20) minutes. Students are required to arrange for the demonstration of working models/software packages developed to the first and second Examiners. This should be done within one week of submission of the Final Report. The date for demonstration of the project should be arranged with the supervisor.

Students who fail ECNG6021 on the first attempt will be required to withdraw. As recognition of the work completed in the MSc. Programme, students have the option of requesting the Postgraduate Diploma or **apply for re-entry after a period of two years**. Students who fail **ECNG6023** will be allowed one opportunity to resubmit their project. Students who fail the re-submission for ECNG 6023 may request the Postgraduate Diploma or re-apply for the MSc. programme after a two years period and must submit a new project.

5. *Project Proposals and Selection of Project*

The proposal must clearly define:

- The project title
- The project category
- Project objectives: What does the project seek to achieve or deliver?
- Activities required for completion of the project.
- Summary of requirements: Hardware, software, key activities, etc.

Project proposals can be proposed by both lecturers and students. Students can check the online MSc Project Portal for a detailed listing of the project proposals proposed by staff.

<http://www.eng.uwi.tt/depts/elec/pgrad/MASCPProject/index.php>.

Students are also encouraged to propose their own projects and choose a project supervisor aligned with their area of research and expertise. Students are strongly encouraged to consult with a potential project supervisors before submitting their project proposals on the MSc Project Portal. All project proposals can be submitted through the Postgraduate Portal and must be approved by the MSc Coordinator and project supervisor before they can be accepted.

For part-time students, it is recommended that the student develop a project based on an area in direct relation to their current job function. This will ensure that the project is relevant and can be performed whilst on the job.

All modifications to the title, aims or objectives must be given written approval by the project supervisor.

6. *Managing Project Execution*

In order to assist students with their projects the Department may host workshops on technical writing, oral presentations, project management, creativity, invention and innovation from time to time. To keep informed about these offers and any other notices students are advised to frequently visit the MASC Project Portal. Students can also ask librarians for assistance with their thesis formatting style and make use of the available resources at the library for their project.

<http://www.eng.uwi.edu/depts/elec/pgrad/MASCProjects/index.php>

<http://libguides.uwi.edu/c.php?g=11399&p=58860>

Suggestions for a successful project

1. Within the first month of receiving the project, clearly understand your objectives. Use this time to determine the resources required to arrive at a satisfactory conclusion to your activities as your supervisor may not be completely aware of all the requirements for completion. As such, all efforts should be made to tightly define the project during the first month and determine the resources required. This includes both human (YOUR TIME) and material resources (parts and component accessibility and availability, software and hardware etc.).
2. If your project requires materials or elements that have to be ordered make sure to place your order as soon as possible. It is normal for an order to take two or more months for delivery.
3. Your job will be made much easier if the project can be decomposed into a sequence of significant steps or milestones. The supervisor should verify these milestones as soon as they are achieved. With this approach you will at least have some definite results if you run out of time.
4. Devise a project schedule (Gantt chart). Even if this must be changed, always work according to a schedule. Because the project is not a scheduled component, personal discipline will be the key to a rewarding and successful attempt.
5. Make every attempt to spread the project write up over the allotted time.
6. Consult with your supervisor regularly, preferably at least once a month. Frequent consultations are useful for detecting problems before they can have a significant impact. Data have shown that infrequent consultations have been the major cause of failure at this level.
7. A comprehensive survey of literature and the subject should be made and notes prepared which will facilitate the writing of the final report. A list of references as well as a bibliography must be included in the Project Report.

7. *ECNG6021*

This is the first phase of your MASC project. During this phase, you are expected to understand the overall objectives, scope and the background / foundation of the project. Also, you should undertake an exhaustive literature survey, data collection if required, initial design strategy, experimental/ investigation setup if needed, solution development etc. Most importantly, you should plan your overall project using Gantt chart with minor and major milestones in your project and then work accordingly to your plan. A 'Project Progress Report' is expected at the end of ECNG6021. For more details and how to prepare an ECNG6021 progress report, please refer to 'Instructions for Preparing MASC Project Reports' document. The progress report will be assessed as indicated in section 4.3.

8. *ECNG6022*

There is no report submission for ECNG6022. You will be closely working with the project supervisor and reports on progress from time-to-time. There is no grade awarded for this. Students who are on the accelerated path, may register for both 6022 and 6023 in one semester. You are directed to work closely with your supervisor on deciding if you can be considered for taking up an accelerated path.

9. ECNG6023

This is the last phase of your project. During this phase, you are actually expected to carry out your experimentation, implementation of engineering design/ solution; rigorous data/result analysis, benchmarking your results etc. A final 'Project Report' is expected at the end of ECNG6023. For more details and how to prepare an ECNG6023 project report, please refer to 'Instructions for Preparing MASC Project Reports' document. The progress report will be assessed as indicated in section 4.3.

A good Project Report should include the following elements:

- Design to specification, following the parameters given in the project proposal and by the supervisor.
- Formulation of creative solutions to overcome different problems during the progress of the project.
- Engineering analysis and enquiry to evaluate and weigh different solutions and methods. Proper use of engineering tools and methods, application of standards, etc.
- Proper testing of the chosen solution under different scenarios.
- Validation against benchmark models, data or solutions.
- Solid and coherent analysis of the results.
- Well written and presented

The team of examiners will look for these elements in evaluating the project. Please refer to **Instructions for Preparing MASC Project Reports**, which is available on the MASC Project Portal for more information on preparing your progress/ project reports.

10. Report Submission

The student shall submit to the MASC Coordinator

- a. Two copies of the Progress report or the Final Report
- b. Report of plagiarism detection software 'Turnitin' on the thesis/project report (Turnitin can be accessed through UWI 'myelearning' portal).
- c. 'Certificate of Completion' (see the link provided on MASC portal or on UWI Graduate Studies website) duly filled in and signed. (applicable only for final report)

Simultaneously, the student shall submit a complete electronic copy in CD-ROM to the project supervisor.

Department/ University has the right to use plagiarism detection software to check the electronic version of the thesis/research paper/project report.

11. Grading

There is no grade awarded for MASC project, unlike other taught courses. Four (4) credits will be awarded for ECNG6021 phase, on successful passing. Eight (8) credits will be awarded for ECNG6023 phase, on successful completion of the project. Please note that the total 12 credits for your MASC project will be reflected into the transcript only after successful completion of ECNG6023. In other words, after successful completion of 6021, your transcript will not show any credits. This is because, your final project actually is 'one course with 12 credits' and is split into 3 parts for your benefit.

12. Resources

The following are recommended for background reading and research.

1. Wilcox, A.D., " Project planning for Electrical Engineers," Prentice Hall Int'l Editions, 1990
2. Scott Fogler, S. & LeBlanc, S. "Strategies for Creative Problem Solving," Prentice Hall PTR, 1994
3. Middendorf, W.D. " What every Engineer should know about Invention", Marcel Dekker, Inc. 1981
4. Horowitz, P. & Hill, W. "The Art of Electronics," Cambridge University Press, 1991 or later

Appendix I: MASC Project Proposal

Project Title
 Project Proposer
 Project Supervisor
 Thematic Group
 Project Keywords

Background Provide all pertinent background information and/or motivation for the project.	
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Objectives List, in as much details as possible, what the project must achieve. This should include for example, target specifications for hardware and software designs	
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Implementation and Methodology Indicate the types of activities required to complete the project	
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Summary of Requirements Indicate the resources required for the successful completion of the project. Pay special attention to cost and the procurement of items not usually in the Department stores	
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Prerequisite Skills and Knowledge	
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General Hardware Requirements	
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General Software Requirements	
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Appendix II: Project Assessment Rubric

Examiner’s Report | ECNG6021 - MASc Project

Candidate’s Name: [Click here to enter candidate’s name.](#)
 Candidate’s Number: [Click here to enter candidate’s number.](#)
 Project Title: [Click here to enter project title.](#)
 Assessment Date: [Click here to enter a date.](#)
 Examiner’s Name: [Click here to enter examiner’s name.](#)
 Examiner’s Comments: [Click here to enter comments \(continue on additional page if required\).](#)

Descriptors and Performance Levels				
No Evidence/Unacceptable	Inadequate/Poor	Adequate	Very Good	Excellent/Outstanding
F A I L		P A S S		
Assessment Category				
Problem Definition		<input type="checkbox"/>	<input type="checkbox"/>	
Review of Literature		<input type="checkbox"/>	<input type="checkbox"/>	
Methodology		<input type="checkbox"/>	<input type="checkbox"/>	
(Preliminary) Results and Data Analysis		<input type="checkbox"/>	<input type="checkbox"/>	
Formatting		<input type="checkbox"/>	<input type="checkbox"/>	

Examiner’s Recommendation: [Select PASS or FAIL.](#)

Examiner’s Signature:

X

Assessment Categories	Description	No Evidence / Unacceptable	Inadequate / Poor	Adequate	Very Good	Excellent / Outstanding
Problem Definition	<p>The introduction must state the context, describe the nature, and explain the impact of the problem.</p> <p>Hypothesis (es) / Research Area(s)/ Objective(s) /Goal(s) and scope should be provided. These must:</p> <ul style="list-style-type: none"> • Be suitable to an MASC research project: • Require higher order thinking (e.g. analyze, evaluate or create); • Match the intended outcomes of the project. 	<p>Any one of the following:</p> <p>No Introduction.</p> <p>No hypothesis (es) /objective(s) /goal(s) and scope.</p> <p>Problem is undefined.</p>	<p>Any one of the following:</p> <p>Incomplete and/or ill-described background to the problem.</p> <p>Unsuitable hypothesis (es) / objective(s)/ goal(s) and scope.</p> <p>Incomplete and/or ill-defined problem.</p>	<p>A fair account of the background to the problem.</p> <p>Suitable hypothesis (es)/ objective(s)/goal(s) and scope.</p> <p>Clear definition of the problem.</p>	<p>A sound account of the background to the problem.</p> <p>Well-pitched objectives that are specific, measurable, achievable, realistic and time-bound.</p> <p>Well-defined problem statement.</p>	<p>Sound, comprehensive background to the problem.</p> <p>Well-pitched objectives that specific, measurable, achievable, realistic and time-bound.</p> <p>Well-defined problem statement integrating, where appropriate, scholarly material that demonstrates the significance of the problem.</p>
Review of Literature	<p>Works used in the review should be scholarly, including seminal material where appropriate; impactful research; and the latest research which establishes the currency of the research problem.</p> <p>A review of literature should:</p> <ul style="list-style-type: none"> • Account for background theory that undergirds the study. • Critically appraise research that informs the study, as it relates to the methodology; system design and testing; validation of results. 	<p>Any one of the following:</p> <p>No research treating with background theory.</p> <p>No research treating with background theory.</p> <p>No research that informs the methodology; system design; testing; validation of results.</p>	<p>Any one of the following:</p> <p>Works cited are ill-suited to the study.</p> <p>Research is inadequate.</p> <p>No attempt to synthesize and critique the literature: The review is a mere re-stating of material.</p>	<p>Works cited are suited to the study.</p> <p>Review is a fair account of underlying theory.</p> <p>Review supports the methodology; system design; testing; validation of results. There is obvious room for elaboration of the review.</p> <p>Some attempt to synthesize and appraise the literature, There are some links between the literature review and the rest of the study.</p>	<p>Works cited are well-suited to the study, well-regarded and current.</p> <p>Review provides a sound analysis of underlying theory.</p> <p>Review supports the methodology; system design; testing; validation of results.</p> <p>Good synthesis and appraisal of the literature. Links between the literature review and the rest of the study are clear and appropriate.</p>	<p>Works cited are well-suited to the study, well-regarded in the field and current.</p> <p>Review provides a sophisticated, comprehensive analysis of underlying theory.</p> <p>Well-synthesized, critical review. The review fully supports the methodology; system design; testing; validation of results.</p>

<p>Methodology</p>	<p>The Methodology Chapter must carefully account for the study's:</p> <ul style="list-style-type: none"> Design and approach. Method/s of data collection. Method/s of data analysis, including system testing, benchmarking and system validation. 	<p>Any one of the following:</p> <p>The study's design and approach have not been described.</p> <p>Data collection strategies are not identified.</p> <p>Data analysis strategies are not identified.</p>	<p>Any one of the following:</p> <p>Unsound study design.</p> <p>Inappropriate data collection methods.</p> <p>Inappropriate data analysis methods.</p>	<p>Acceptable study design, possessing a few flaws.</p> <p>Appropriate data collection strategy.</p> <p>Appropriate data analysis strategy.</p>	<p>Sound study design.</p> <p>Sound data collection and analysis strategies.</p>	<p>Sophisticated study design.</p> <p>Sophisticated data collection and analysis strategies.</p>
<p>Results and Data Analysis</p>	<p>The Results Chapter must:</p> <ul style="list-style-type: none"> Account for deliverables. Demonstrate the trustworthiness of results. Present data clearly and accurately. 	<p>Any one of the following:</p> <p>Key objectives were not met</p> <p>Little or no data.</p>	<p>Any one of the following:</p> <p>Supplies too few deliverables.</p> <p>Data are not trustworthy.</p>	<p>Some core objectives were met.</p> <p>Data are trustworthy.</p> <p>Data presentation is clear and accurate for the most part.</p>	<p>Supplies all core deliverables and expected results.</p> <p>Data are trustworthy.</p> <p>Data presentation is clear and accurate.</p>	<p>Exceeds anticipated deliverables.</p> <p>Outstanding results, with demonstrable research value.</p> <p>Data are valid, reliable, and well-presented.</p>
<p>Discussion</p>	<p>The Discussion Chapter:</p> <ul style="list-style-type: none"> Interprets the results , including trend analysis where appropriate. Demonstrates the significance of the results in the context of the research problem and space. Explores research limitations and assumptions. 	<p>Any one of the following:</p> <p>No attempt at interpreting data.</p> <p>Results are not related to body of knowledge and problem space.</p>	<p>Any one of the following:</p> <p>Weak analysis of results.</p> <p>Significance of the results in the context of the body of knowledge and research space is underexplored and/or insupportable.</p>	<p>Adequate probing of results: Some exploration of the significance of results and some identification of patterns/trends in the data.</p> <p>Adequate account of underlying assumptions and dependencies.</p> <p>Results are related to body of knowledge and problem space.</p>	<p>Results are carefully probed: Significance of the results is well-accounted for. Main trends/patterns are analyzed.</p> <p>Good account of underlying assumptions and dependencies.</p> <p>Results are well-related to the body of knowledge and problem space.</p>	<p>Insightful probing of results. Significance of the results are well-accounted for. Trends/ patterns/ anomalies are analyzed.</p> <p>Intelligent exploration of the underlying assumptions and dependencies.</p> <p>Results are well-related to the body of knowledge. Implications of the results to the problem space is carefully explored.</p>

<p>Conclusions</p>	<p>The Concluding Chapter:</p> <ul style="list-style-type: none"> Assesses the degree to which objectives were met based on evidence (results presented). Identifies limitations in the study and proposes workable solutions. Provides recommendations for extending the work. Original conclusions with prospects for scholarly publications. 	<p>Any one of the following:</p> <p>No assessment of project's accomplishments.</p> <p>No treatment of study's limitations.</p> <p>No recommendations for extending the work.</p>	<p>Any one of the following:</p> <p>Incomplete/ unsupported assessment of study's accomplishments.</p> <p>Little exploration of the study's limitations.</p> <p>Too few or unrealistic recommendations for extending the work.</p>	<p>Main accomplishments with supporting evidence are discussed.</p> <p>Main limitations are explored and some solutions are proposed.</p> <p>Proposes how the work may be extended.</p> <p>Conclusions produced contributions to the researched area and acknowledgeable in the technical research community.</p>	<p>Accomplishments are supported with evidence and are evaluated in the context of the research objectives, project's scope and problem space.</p> <p>Limitations are explored and workable solutions are offered.</p> <p>Proposes how the work may be extended.</p> <p>Presents an argument with scholarly basis to extend the contributions of the report.</p> <p>Conclusions produced original contributions to the researched area, acceptable in the technical research community and can yield a non-refereed scholarly publication.</p>	<p>Accomplishments well-supported with evidence and are carefully evaluated in the context of the research objectives, scope and problem space.</p> <p>Limitations are thoroughly explored. Novel, workable solutions are offered.</p> <p>Proposes how the work may be extended, including novel ways.</p> <p>Presents an articulated argument with scholarly basis to extend the contributions of the report.</p> <p>Conclusions produced significant and original contributions to the researched area acceptable in the technical research community and can yield a refereed scholarly publication.</p>
<p>Language and Organization</p>	<p>The MAsc report should be:</p> <ul style="list-style-type: none"> Free of grammatical errors. Use concise and clear language. Coherent as signalled by well-sequenced and well-supported arguments. 	<p>Any one of the following:</p> <p>Intrusive grammar errors.</p> <p>Imprecise, verbose, unclear language.</p> <p>Intrusive organizational problems.</p>	<p>Any one of the following:</p> <p>Many grammar errors.</p> <p>Language is frequently imprecise, verbose, and unclear.</p> <p>Frequent sequencing problems.</p>	<p>Report is generally well-written, with some grammar errors.</p> <p>Language use is acceptable, but there is clear room for refinement.</p> <p>Report is fairly coherent with acceptable argumentation: There is room for revision.</p>	<p>Report is well-written, with few grammar errors.</p> <p>Clear attempt to write clearly and concisely, with some room for improvement.</p> <p>Arguments are supported, mostly clear and well-sequenced.</p>	<p>Report is well-written, save for a few minor grammar errors.</p> <p>Clear, concise use of language.</p> <p>Argumentation is clear and easy to follow: Arguments are well-developed, carefully elaborated and logically sequenced.</p>

<p>Formatting</p>	<p>The report must comply with MASc formatting guidelines (as they relate to font, layout, section numbers, figure/table/equation captions, use of abbreviations, lists: tables of contents, figures, tables, equations, abbreviations and indexes).</p> <p>References must be styled according to the Chicago Manual of Style (CMoS) (author-date) 16th edition or later.</p>	<p>Any one of the following:</p> <p>Report does not comply with many formatting requirements.</p> <p>References are not presented in the author-date, CMoS format.</p>	<p>Any one of the following:</p> <p>Is poorly formatted.</p> <p>References are not presented in the author-date, CMoS format or CMoS is frequently incorrectly used.</p>	<p>Fair attempt to comply with formatting guidelines.</p> <p>References comply with CMoS, with some exceptions</p>	<p>Report complies with formatting guidelines, with minor infractions.</p> <p>References comply with CMoS, with few exceptions.</p>	<p>Report complies with formatting guidelines.</p> <p>References comply with CMoS.</p>
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