



**Independent University, Bangladesh**

# **UNDERGRADUATE SENIOR PROJECT MANUAL**

**Department of Electrical & Electronic Engineering**

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## **Guidelines for senior project**

These guidelines may serve as a framework for undergraduate research projects. These guidelines cover the procedures, goals, and responsibilities of students and faculty members involved in undergraduate research. Students involved in undergraduate thesis/senior project should enroll for EEE498 / ETE498.

## **Objectives**

The objective of this manual is to provide a clear idea about the strategy for developing a senior project. It also guides students and faculty members about the Undergraduate Thesis/Senior Project.

## **Steps to follow**

1. *Selecting a thesis supervisor* for senior project.
2. *Submitting a research proposal* to the department office through the thesis supervisor.
3. *Submitting the senior project application form* to the department office. A prescribed application form is available in the department office.
4. *Conducting the research* (preferably in 2~3 terms) with the supervisor.
5. *Submitting the draft report* to the thesis supervisor.
6. *Defending the thesis*. The exam date (normally at the end of each term) will be announced by the department.
7. *Submitting the report* to the department office for final grading.

## **Thesis Supervisor**

Students completing at least 100 credits can select their thesis supervisor from the department of EEE based on their research interest. Students may discuss with their academic advisor to find their thesis supervisor in their research field of interest. Students may also select their supervisor from outside IUB taking the prior permission from the EEE department. In this case, student must choose a co-supervisor from the EEE department of IUB.

## **Research proposal**

A written *Research Proposal* is required to initiate an senior project and is due before submitting the application of senior project. The proposal is a description of the research to be conducted by the student and is normally 2-3 A4-size pages in length. The proposal is a written statement/plan of intent for what is to be researched, investigated, and pursued. The proposal establishes a clear focus by framing a research question. These range from empirical research questions or hypotheses to a statement of intent. The proposal establishes the principal question to address, establishes a context for that question, and outlines what steps will be taken to answer the question. The research plan should be clearly written and the goals or objectives of research should be clear to anyone reading the proposal. The proposal is not a contract; instead its function is to help students identify a problem to be investigated and to outline the direction of their research. The proposal is not intended to be rigid but rather a document that evolves as the research proceeds during subsequent terms in response to unanticipated results, problems, or emerging directions. Students should expect to revise several iterations of their project proposal in response to comments from their supervisor. Once accepted and signed by the supervisor, the student will submit the research proposal to the department's office along with the application of senior project.

The research proposal will include the following points:

- Tentative title / research area
- Problem identification
- Socio and economic implications
- Literature review, Background and Motivation
- Goals and Objectives
- Methodology and Implementation / Validation (theory, simulation, experiments etc.)
- Work plan
- Expected outcome and impacts

A *format* of the research proposal is available in the department office and website. A *sample* of the research proposal is also available in the department office and website.

### **Conducting the research**

- The plan for completing the research as described in the research proposal should envision approximately 6 hours per week (including work in the laboratory, field, library, etc.).
- Ideally, fieldwork, laboratory studies, and/or other data collection should be completed early in the term before the student plans to graduate.
- Students must meet their thesis supervisor at least twice a week to inform about their research progress.
- Students must begin to write their thesis at least one month before the student plans to defend the thesis.
- Students must submit their thesis report to their supervisor at least two weeks before the final presentation.

### **Defending the thesis**

Students have to present their research outcome by power point presentation. The presentation schedule will be announced by the department possibly at the end of each term. The students will prepare their power point slides and give a number of practice presentations in front their supervisor and fellow classmates before coming to the final presentation. The total number of slides will be approximately 10-15 which includes the following topics:

- Title page
- Outlines of presentation
- Background, Motivation, Objectives
- Methodology (theory, simulation, experiments etc.)
- Results and discussions
- Summery
- Future works

The distribution of presentation time will be as follows:

- Presentation – 10 mins
- Q/A session – 5 mins

### **Examination committee**

The examination committee members will be assigned by the department Head. One or more external members may be included in the committee.

## **Grading policy**

The undergraduate thesis/senior project will be graded by the members of examination committee including the thesis supervisor. In this regard, the weight of marks distribution will be as follows:

Performance evaluated by senior project supervisor	-	50%
Report evaluated by examination committee	-	25%
Oral presentation evaluated by examination committee	-	25%

## **Report writing**

The undergraduate thesis will be at least 40 pages (12-point Times New Roman, 1.5-line spacing) excluding the appendix and preliminary pages. Student must write their report according to the format of undergraduate thesis. A template of senior project is available in the department office and website.

## **Plagiarism**

The department of Electrical and Electronic Engineering (EEE), Independent University, Bangladesh considers plagiarism as a very serious issue. In submitting assessed written work it is important to beware of plagiarism, which is the unacknowledged use of other people's material. The department considers this as cheating and it can have serious consequences, even if it is unintentional. Disciplinary action will be taken and the University policy shall be strictly reinforced in this regard. To avoid any misunderstanding, students are advised to put quotations from other authors within quotation marks and give full references to every source they use, even if they are not quoting directly from it. Students can take advice from their supervisor if they are worried about unintentional plagiarism.

## **Report submission**

Three copies of hard binding (one copy each for thesis supervisor, IUB library and EEE department) and a soft copy (PDF format) of the report must be submitted to the department office for final grading. Students must submit their preliminary / draft report to their thesis supervisor at least two weeks before the final presentation or according to the direction of the thesis examination committee. Student must modify the report according to the comments / feedback received from the thesis supervisor and other examiners, if any, before submitting the final report to the department office.

## **Organization of the report**

The organization of the report will contain the following pages:

**Title Page**

**Declaration Page**

**Approval Page**

**Acknowledgements**

**Abstract**

**Contents Page**

## **List of Figures**

## **List of Tables**

## **Chapter 1: Introduction**

## **Chapter 2: Literature Review & Methodology**

## **Chapter 3: Main Work**

## **Chapter 4: Results and Discussions**

## **Chapter 5: Conclusions**

## **References**

## **Appendices**

## **Contents of the chapters**

### **Chapter 1: Introduction**

A brief description of background, motivation and objectives should be placed in this chapter. The organization of this report shall also be included in here.

### **Chapter 2: Literature Review & Methodology**

A review of the literatures that found in the research area, with particular emphasis on theories and debates on the subject should be included in this chapter. A review of the methods those used to carry out this research with a discussion of the strengths and weaknesses of the approach followed and the approaches rejected will also be placed here. This will place the research into a broader academic context and may give a theory or hypothesis that someone wishes to test in empirical research.

### **Chapter 3: Main Work (Design, Implementation, Experimentation, Simulation etc.)**

A detail analysis of theoretical studies and experiments (if any) to carry out this research should be placed in this chapter.

### **Chapter 4: Results and Discussions**

An account of what found from this study and a more critical analysis of the results in which someone discuss the results in the context of the original aims should be placed in this chapter.

### **Chapter 5: Conclusions**

A brief summary of the findings and recommendations for future work should be included in this chapter.

## **Format of the report**

### **I. GENERAL DOCUMENT GUIDELINES**

**Paper:** The thesis must be printed on good quality white paper on both side of the paper.

**Length:** Minimum length is 40 pages, which only includes the main text and excludes the endnotes and appendices. There is no Maximum number of pages. The thesis will be evaluated based on the quality instead of length.

**Margins:** Left Margin – 3 cm, Right Margin – 2.5 cm, Top Margin – 2.5 cm, Bottom Margin – 3 cm, Header 1 cm, Footer 1.5 cm.

**Font Size and Type:** 12-point Times New Roman font.

**Line Spacing:** Documents should be 1.5-line spacing throughout, with the exception of the text of table having more than two lines in a cell.

**Paragraph Indentions:** 1 cm

**Order of Materials:** Title Page, Declaration Page, Approval Page, Acknowledgments, Abstract, Table of Contents, List of Figures, List of Tables, the Text of the Thesis, List of References, Appendix. (see the template)

**Numbering of Pages:** Page numbers must be centered 1.5 cm below the bottom margin as set by the footer. There is no heading to the left or right of the page number. The placement of page numbers must be consistent throughout the thesis. Pages should be numbered sequentially throughout the chapter. Preliminary pages are numbered as follows:

- The title page is counted as page i (assumed, do not print number)
- The remaining preliminary pages are numbered with lower case Roman numerals (ii, iii, etc).
- The main body of the text and the reference section are consecutively numbered with Arabic numerals beginning page “1” and continuing throughout, including text, illustrative materials, list of references, and appendices.

### **II. PRELIMINARY PAGES**

The preliminary pages include the title page, declaration page, signature page, acknowledgements, abstract, table of contents, list of figures and list of tables. No page numbers should be shown for the title page but it is assumed to be page i. Then starting from the declaration page until abstract pages will be numbered with lower case Roman numerals and considered to be page ii to ix.

**Title page:** (see the template)

1. Logo of Independent University, Bangladesh.
2. Name of Independent University, Bangladesh: Title case, **Bold**, Times New Roman, 14-point, Centered.
3. Title of Thesis: Title case, **Bold**, Times New Roman, 20-point font, Centered.
4. Student’s Name and ID: Title case, Times New Roman, 14-point font, Centered.

5. Statement of presentation in the form: “in Consideration of Partial Fulfillment for the Requirements of the Degree of BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONIC ENGINEERING”; Times New Roman, 12-point font, Centered.
6. Name of the Department: Title case, Times New Roman 14-point font, Centered.
8. The term and Year of thesis submission: Title case, Times New Roman, 14-point font, Centered.

**Declaration page:** (see the template)

1. The word “DECLARATION” upper case, **Bold**, Times New Roman, 16-point font, Centered.
2. The declaration “I do hereby ..... an academic qualification / certificate / diploma or degree: Title case, Times New Roman 12-point font, justified.
3. Student’s Name and ID: Title case, Times New Roman, 12-point font, Centered.
4. Signature of students with date: Title case, Times New Roman, 12-point font, Centered. Original signature of the students’ must be put above the name and ID.

**Approval Page:** (see the template)

1. Title of Thesis: Title case, **Bold**, Times New Roman, 16-point font, Centered.
2. Student’s Name and ID: Title case, Times New Roman, 14-point font, Centered.
3. Approval from thesis supervisor in the form “has been approved on 15 April, 2012”: lower case, Times New Roman, 12-point font, Centered.
4. Supervisor’s name with title and Academic Position: Times New Roman, 12-point font, Centered.
5. Original Signature of thesis supervisor in the final copy is required (if submitting electronically, the signature page is left unsigned)

**Acknowledgments** (see the template): This page is to thank those who have helped in the process of obtaining the degree. Permission to quote copyrighted material is listed here, as well as acknowledgments for grants and special funding, if any. This should occupy a single page and be 1.5-line spaced.

**Abstract** (see the template): The thesis must contain an abstract. An abstract is a concise account of the thesis or dissertation and should state the problem, describe the procedure or method used, and summarize the conclusions reached. Paragraphs are formatted with the same layout used in the document. This should occupy a single page and be 1.5-line spaced.

**Table of Contents** (see the template): Follow the format of the abbreviated sample included in these instructions. For clarity, use 12-point font. All chapter titles, headings and subheadings should appear in the Table of Contents. Font style of items listed within the Table of Contents should be the same as the font used within the text (e.g. headings listed within the Table of Contents are in the same font style as in the body of the thesis).

**List of Figures and List of Tables** (see the template): The list of figures/ tables must conform to the examples provided in the template and include all tables or figures (i.e. illustrations, photographs, pie/bar charts, and maps) within the body of the thesis listed by table/figure number and table/figure caption. The figure number should be placed below the figure followed by the figure caption and be centered. The table number should be placed above the table followed by the table caption and be centered.

### **III. BODY OF THE THESIS:**

**Page numbering:** The body of the thesis and appendices are numbered in Arabic numerals starting with 1 and continuing until the last page of the thesis.

**Chapter:** The first line of the first chapter will be “**CHAPTER 1**”, **uppercase, 20-point bold**. Two lines below this appears the title of the chapter in capital letters, centered. Use an inverted pyramid and 1.5 line spacing succeeding lines of the title if it is longer than one line. Three lines below the chapter title, place the first line of text. Succeeding chapters, “**CHAPTER 2**”, etc., should follow this same format. Do not use terminal punctuation on any chapter headings. Each chapter should begin on a new page.

Example

# **CHAPTER 1**

## **INTRODUCTION**

**The first level of chapter 1 will be placed here.**

**Headings and Sub-headings of Chapters:** The subdivision within a chapter or section does not begin on a new page unless the preceding page is filled. If there is not room for the complete heading and at least two lines of text at the bottom of a page, the new subdivision should begin on the next page. All chapter titles and headings should follow the following example.

Example

### **1. 1 First level heading: Sentence case, Bold, 12 point.**

You would indent and start writing the text here

#### **1.1.1 Second level heading: Sentence case, Bold, 12 point.**

You would start writing the text here after the period and keep wrapping around underneath the subheading like this.

##### **1.1.1.1. Third level heading: Lower case, Italic, 12 point.**

You would start writing the text here after the period and keep wrapping around underneath the subheading like this.

**Captioning and Numbering the Figures:** The numbering of figures will start with the chapter number followed by the numbers in Arabic numerals by placing a decimal point in between. For example, figure numbers in chapter 2 will start as Figure 2.1, Figure 2.2 and so on. The figure caption will follow the figure number and should be placed at the bottom of each figure. Below is an example of figure caption and number.

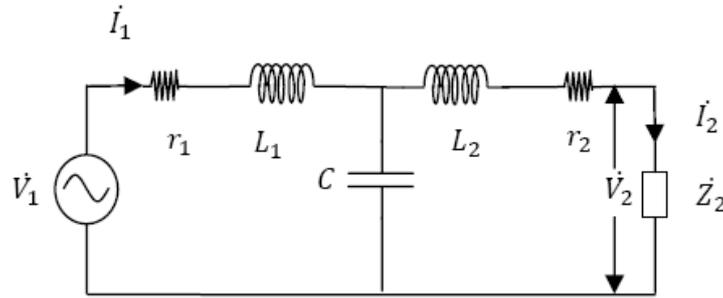


Fig. 2.3 T-LCL type immittance circuit

**Captioning and Numbering the Tables:** The numbering of tables will start with the chapter number followed by the numbers in capital Roman by placing a hyphen in between. For example, table numbers in chapter 3 will start as Table 3.1, Table 3.2 and so on. The Table caption will follow the Table number and should be placed at the top of each Table. Below is an example of figure caption and number.

Table 3.1 Circuit parameters of proposed immittance circuit

Components	Values
$V_1$	200 [volt]
$L_1 = L_2$	23.6 mH
C	15.6 $\mu$ F
$r_1 = r_2$	0.28 $\Omega$

#### IV. REFERENCES

Be sure that if a work is cited in the text, it must be in the references and vice versa. The references must be cited in the text as ascending order as they listed and be 1.5-line spaced. With regard to the format of the references, using a hanging indent i.e. the first line of the reference is flushed all the way to the left margin and the rest of the reference are indented ½ cm. First and middle name (if given) of the author(s) are listed in initials only. The title of the work should be placed within double inverted comas followed by journal title / conference name (in italic), issue/volume number, page numbers and year of publication is in parentheses with the exception for books, electronic resources and company report. The above rules for listing references of journal articles, conference proceedings, books, and electronic sources (websites) are presented with examples as follows:

1. For Journal Articles

[1] M. A. Razzak and S. Takamura, "Study on Generalized Immittance Converter", *IEEE Transactions on Circuits and Systems*, Vol. 3, pp. 746-751 (2012).

2. For Conference Proceedings

[2] M. A. Razzak and Bing Zeng, "A Constant Current Immittance Conversion Circuit", *IEEE International Conference on Circuits and Systems*, 14-17 December, 2011, Sydney, Australia, pp. 746-751.

3. For Dissertation/Thesis
  - [3] M. A. Razzak, “Design and Implementation of a Novel Immittance Conversion Circuit for Constant Current Applications”, A Doctoral Dissertation presented at Nagoya University, Japan (January, 2005).
4. For Internship Report
  - [4] N. R. Rahman, “Study on Substation Equipment and Switchgear & Protective Devices at DESCO”, An internship report presented at Independent University, Bangladesh (December, 2010).
5. For Books
  - [5] D. C. Aurther, Circuits and Systems, Wiley and Sons, 2nd Edition (1995).
6. For Electronic Resources (websites)
  - [6] <http://www.ittanceconverter.com/> accessed on 14 March, 2012.
7. For Company/Industry/Organization Report
  - [7] DESCO Annual report, March, 2012.

## **V. APPENDICES**

Appendices may include data tables, source codes, analytical procedures, survey forms, or any other supplementary material provided by supervisory committee. Each Appendix begins on a separate page. Each Appendix is labeled by ascending letters (e.g. A, B, C, etc.) and title. Pages should be numbered in sequence with the rest of the thesis. Same margins and line spacing should be maintained as used in the body of the text.