

Thesis and Project Report Template for Reykjavík University

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Thesis of 30 ECTS credits submitted to the Department of Engineering at Reykjavík
University in partial fulfillment of the requirements for the degree of Master of
Science

May 23, 2022

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List of Symbols

Symbol	Description	Value/Units
E	Energy	J
m	Mass	g
c	Speed of Light	$2.99 \times 10^9 \text{ m s}^{-2}$

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Abstract

The goal of this template is to produce electronic output to be uploaded to Skeman that can be later printed out and bound into a professional looking textbook that fits on standard library shelves. It is important to note that A4 paper when bound requires taller shelf spacing, so the B5 paper format was chosen instead. When binding a book, the edges that face outward need to be very smooth to reduce contamination and dust from entering the book when it sits on a shelf; this is why traditionally a larger paper size is cut down to the book size. If your print house expects the stock to be A4, then make sure the rubook has the “a4paper” option. If they prefer to deal with preparation themselves from a B5 pdf, then the default “b5paper” option is correct. The template is optimized for lualatex, but should still work with pdflatex.

The abstract goes here in English or Icelandic. It should be a fairly short summary of the entire document. If you switch to Icelandic mode (IS option to ruthesis) then abstract will become Útdráttur

Keywords / Efnisord: Keywords, separated, by, commas

Acknowledgments

So long, and thanks for all the fish.

Douglas Adams[1]

This work was funded by 2022 RANNIS grant “Survey of man-eating Minke whales” 1415550. Additional equipment was generously donated by the Icelandic Tourism Board.

Acknowledgements are optional; comment this chapter out if they are absent Note that it is important to acknowledge any funding that helped in the work

Part I

Getting Started

Chapter 1

Instructions

Is this the right template for you? If you are not a Reykjavik University student, this is probably not for you. For everyone else, please read the instructions before getting started. It is likely to save you a lot of frustration and errors.

1.1 Introduction

These instructions detail how to prepare a final project report, master's thesis, or PhD dissertation for Reykjavík University. These instructions (unless otherwise stated) assume you are in the School of Science and Engineering or the School of Computer Science. If you are in another department, you should make sure that the template meets your specific requirements.

- Current maintainer: Joseph Timothy Foley. Questions, comments, complaints: <foley AT ru.is>

1.1.1 Department of Engineering Links

Information for Students <https://www.ru.is/tvd/upplysingar-fyrir-nemendur/>

General MSc Rules https://www.ru.is/media/tvd/skjol/Rules-for-MSc-programmes-at-RU-SSE-2017_as_accepted_15_08_2017-003-.pdf

MSc Thesis Rules https://www.ru.is/media/tvd/skjol/Vidbotarreglur_um_meistaraverkefni_2017_as_accepted_15_08_2017.pdf

1.2 Where to get the files

Actively developed code: <https://github.com/foleyj2/ru-thesis>

Overleaf Template: <https://www.overleaf.com/latex/templates/reykjavik-university-project-report-and-thesis-template/fcwvcgnstrjs>

Old code: <https://repository.cs.ru.is/svn/thesis-template/branches/stable/RUThesisTemplate.zip>

Old Overleaf Template: <https://www.overleaf.com/latex/templates/reykjavik-university-project-report-and-thesis-template/fwdnqmdvqcgj>

RU Official Help page: <https://help.ru.is/index.php?/Knowledgebase/Article/View/156/0/final-projectthesisdissertation-template>

1.3 Files and Directories/Folders

- `graphics/`: contains the graphics to generate this document.
- `covers/`: contains the official covers (from RU Communications) to be put on the outside of the finished book.
- `IEEEtran/`: contains the IEEE citation style files

1.4 Signatures

Please make note of the signature pages at the beginning of the document. These need the examiner's and advisors' signatures to be complete. There is also a page for copyright release that needs to be signed so the library can keep a copy. You must include the signed pages when you upload your document electronically to Skemma.

1.5 Printing

If you decide to print, make sure you are doing it on archival acid-free paper. Otherwise, your document will yellow and fall apart in the library over time. Traditionally, the student prints out and binds a copy for each advisor and examiner. This may also be required if the research was funded or in certain circumstances. If you are using a printing house to take care of the binding, they may be able to take the completed PDFs (cover and inside text) and print them for you. Check with the printing house if they want it as A4 (to be trimmed) or as B5 (which they will take care of resizing).

1.6 Submission

When your document is finished and approved by your advisor, it needs to be uploaded to Skemma <https://skemman.is>. An important thing to remember is that

the uploaded document will follow you for the rest of your career: employers are likely to find it and skim it. Make sure the document is something you would be proud to have associated with you.

The general submission sequence is:

1. Defense complete, minor corrections complete after 3 days of work.
2. Save the completed thesis text as `main.pdf`
3. Open the official cover files in `cover`, fill in the appropriate fields, and save as a `cover.pdf`
4. Use a PDF binding tool such as PDFsam <https://pdfsam.org> to put the cover before the first page and save as `thesis.pdf`
5. Upload the finished `thesis.pdf` to Skemman.
6. An autogenerated email is sent from Skemman. This email should be forwarded to your admin such as Sigrún Þorgeirsdóttir <[sigrunth AT ru.is](mailto:sigrunth@ru.is)>.
7. Grade for the thesis is published.
8. Graduation!
9. Sometime after graduation, the published thesis is released by RU on Skemman for others to read and enjoy.

1.7 LaTeX Template Instructions

Some information is at the top of `main.tex` file, this file is for a general overview and common problems.

1.7.1 Getting started:

1. Find a safe place to work on your thesis document. The author recommends Git on Overleaf, but anywhere data is backed up is appropriate. If you wish to have a repository to be setup for your thesis on `openproject.cs.ru.is`, email [csit AT ru.is](mailto:csit@ru.is). If you are working with sensitive information, you should avoid bitbucket, google drive, dropbox, and any other free cloud service. If you think this is unnecessary, just consider how much time you will lose if your computer crashes. Due to Murphy's law, this is likely to happen just before your thesis is due¹.

¹This has happened many times.

2. Get a LaTeX installation. We recommend TeXlive <https://www.tug.org/texlive/> For this template on windows, MiKTeX will also work, but will run very slowly the first time you render the template. You will need to enable the “miktex” option in the template to substitute packages. It is very very important that you run the “MikTeX Update Wizard” before you start. Otherwise you may get errors when you try to build the document.

Under linux this is the “texlive” package. Under Mac/OSX this is the “MacTeX” distribution.

Alternatively, if nothing you are doing is particularly private or proprietary, you can do development online using Overleaf. In this case, you won’t need to setup the rest of the tools mentioned below except perhaps the Reference Manager mentioned in step 4.

- a) RedHat: `sudo yum -y install texlive-collection-fontsrecommended texlive-biblatex-apa,apa-doc,ieee,ieee-doc texlive-xargs,lipsum,lastpage,luatex,pseudocode,url,examplep,listings,xspace,pgf,tikz,amsfonts,amsmath,amssymb,siunitx,svn-multi,subfig,fixme,textpos,biblatex,makeglos,nomencl,xwatermark,ltxkeys,framedox,printlen` Getting biber installed on older RedHat systems is a bit tricky for unclear reasons. The metapackage you need is at <https://copr.fedoraproject.org/coprs/cbm/Biber/>
 - b) Debian/Ubuntu: `sudo apt-get -y install texlive-full pgf latex-xcolor` If you don’t want to install everything, this list of packages is known to work: `sudo apt-get -y install texlive texlive-luatex texlive-latex-extra texlive-science texlive-generic-extra texlive-lang-european texlive-lang-german latex-xcolor texlive-pictures pgf texlive-bibtex-extra texlive-publishers chktex evince fonts-lmodern lmodern biber`
3. Get a LaTeX Integrated Development Environment (recommended, but not required) <http://texstudio.sourceforge.net/> or <http://www.xmlmath.net/texmaker/> Some editors may include LaTeX support. If you want to learn a very powerful (but old-fashioned) editor <http://www.gnu.org/software/emacs/> Install the auctex package by: `M-x list-packages`, click on AUCTeX
 4. Get a references manager (recommended, but not required) <http://jabref.sourceforge.net/> (You may have to install a Java JRE first.) The reference library is in `references.bib` by default. It is just a text file that can be edited, but be careful with the formatting. A common mistake is to forget “,” at the end of each piece of an entry/line.

If you are going to make glossaries or acronym lists, you will need a perl interpreter. Only windows usually needs this installed: <http://www.activestate.com/activeperl>

5. Get supporting programs for some tools. For glossaries under windows, you will need to install Perl <http://strawberryperl.com/> (it is already installed on the other platforms.)
6. Try building the `main.tex` file. If you get errors, there is something wrong with your LaTeX installation. Fix those first.
7. Rename the `main.tex` file with your information (optional). DEGREE-NAME-YEAR is the recommended scheme e.g. `msc-foley-2015.tex`. This is referred to as the "Main" file.
8. Set your UI to use `lualatex` as the processor. If you are typing commands in manually, this is by typing in `lualatex main.tex`
9. Open and read the options at the top of the previous file and set it up for your document. You will need to fill in the title and author at least.
10. Start editing all of the `.tex` files with your content.
11. Compile the document by running `lualatex` on the Main file, run the bibliography tool, then view the result.
12. When you print, make sure that the scale is 100%. If you allow it to resize when printing, the margins won't be right. If the margins aren't right, then the RU logo will not look right on the cover.

1.7.2 Important Details

- Make absolutely sure that your `references.bib` is in UTF-8. If it is another format (CP1251,etc) you may get weird problems with any accented characters. *Students have run into encoding issues in the past and it has taken a surprisingly long time to debug.*
- Make sure the rest of the files, particularly the `.tex` file are in UTF8 or are at least in the same encoding. If the files are in different encoding, you will discover errors with accented characters when you try to include them together. Watch out for line endings. Linux, Windows, and OSX all use different line endings in text files.
- You may wish `biber/biblatex` instead of `bibtex`. (The template may already do this.) Otherwise Icelandic characters may not work properly in your `references.bib` file. TeXMaker and TeXStudio require a configuration change to do this.
- Be consistent about UPPER and lower case in naming files. Windows doesn't care (but some programs in Windows do). OSX sometimes cares. Linux always cares.

- When using this template with SVN, you will want to tell it to ignore the extensions listed in Appendix 1.12.1

1.8 SE Master's Thesis Special Instructions

These rules are adapted from https://www.ru.is/media/tvd/skjol/Vidbotarreglur_um_meistaraverkefni_2017_as_accepted_15_08_2017.pdf

1.8.1 Rules: Adopted by the School Council August 15th 2017

The following rules are an addition to RULES FOR MSc PROGRAMMES AT REYKJAVÍK UNIVERSITY'S SCHOOL OF SCIENCE AND ENGINEERING as adopted by the council of the School of Science and Engineering August 15th 2017.

The Council of the School of Science and Engineering first adopted these rules on 19th March 2010 and they have since undergone minor revisions.

In 2022, members from the School of Engineering, School of Computer Science, and Communications met to simplify the requirements and harmonize them between the two departments.

In order to graduate with an MSc degree from the School of Science and Engineering (SSE) all students must complete a project that results in a formal thesis and a public defence of the thesis. The thesis can be submitted either in English or Icelandic and should sufficiently present a body of work commensurate with the number of credits of the particular MSc project.

1.8.2 Thesis Layout and Form

The layout and form of the thesis shall in general be according to good practice for a thesis of this type. The student shall consult his/her supervisor on an appropriate structure for the thesis, appendices to the thesis and the reference system, taking into account established practice within the specific field of research. Each department within the School of Science and Engineering may set rules that further specify the form and layout of the thesis, including a recommended template.

In general, the thesis is expected to contain the following:

- Front and back cover (standard)
- Title page (standard format)
- Abstract (in English or Icelandic)
- Acknowledgements (optional)
- Preface (optional)

- Table of contents
- List of tables
- List of figures
- List of drawings and enclosed material, e.g. CD (as appropriate)
- Body Text
- References
- Appendices (as appropriate)

The front cover, front page, title page and back cover have a specific form as shown in the attached examples and shall contain all information requested. No variation from this form is permitted. If the thesis is written in English, the title on the title page shall be in English; however, an Icelandic translation of the title must be presented with an Icelandic abstract, and vice versa if the thesis is written in Icelandic.

An abstract is mandatory in English or Icelandic, following the language of the main text. The maximum length of abstract is 300 words. At the end of the abstract there should be a list of up to five keywords reflecting the content of the thesis.

The printed version of the thesis shall be on white paper of size B5 and weight 80 g m⁻². The cover pages will be provided by the School. In general, the font should be STIX2 in 10 points. Guidelines for page numbering and layout:

- Page numbering is normally i, ii, iii, iv, ... for material preceding the first chapter of the thesis (i.e. for abstract, signature page, acknowledgements, preface, table of contents etc.) and then 1, 2, 3, starting from the 1st chapter (Introduction) and continuing throughout the thesis, including the appendices.
- Page numbers should in general be centered at the bottom of each page.

Only in exceptional cases may the thesis have a different form. While the thesis itself has to comply with the layout instructions in regards to the cover pages, abstract and the signature page, it can consist mainly of publishable research paper manuscripts. In this case, the manuscript(s) shall be preceded by a detailed section of introduction to the research topic with a corresponding in-depth literature review and detailed description of the methods used in the MSc project. The minimum length of this section shall be 20 pages excluding a reference list. This format of the MSc thesis should only be used if the supervisor of the thesis assesses the outcome of the MSc project to be publishable in indexed peer reviewed journals in the relevant field of research. If this format of the MSc thesis is used, the student's supervisor has to request a formal acceptance of both the student's Department Head and the Director

of Graduate Studies, with a letter summarizing the findings of the project, the novelty beyond the state of the art and the contribution of all authors of the manuscript. This request has to be sent to the Department Head and the Director of Graduate Studies prior to $t - 50$ (where t is the graduation date). The Department Head and Director of Graduate Studies can forward the request to the Graduate Study Council for further evaluation if they find it necessary.

1.8.3 Limited Access

In general, access to the MSc thesis shall be open. If restricting access to a thesis is sought, e.g. for the purpose of protecting intellectual property or protecting commercial interests of an industrial partner participating in the MSc project, permission needs to be acquired, see *Reglur um skil á lokaritgerðum og lokaverkefnum við Háskólann í Reykjavík* (<http://www.ru.is/bokasafn/skemman>). If restriction of access to a thesis is granted it should be clearly stated in the thesis right after the keywords following the abstract with specification of the date at which the restriction of access should be lifted.

1.8.4 Submission and Deadlines

The official completion of the MSc thesis is signified by the student submitting the final electronic (PDF) version of the thesis, signed by himself/herself, the supervisor(s) and the examiner to the SSE office and uploaded to Skemman, (see <https://www.skemman.is>). See also RU's rules for submission of theses and final projects (*Reglur um skil á lokaritgerðum og lokaverkefnum við Háskólann í Reykjavík*, <http://www.ru.is/bokasafn/skemman>).

If a student plans to graduate in a particular graduation ceremony, the following deadlines must be respected. Should any of the deadlines below not be respected the student will have to wait for the following graduation ceremony before he/she can graduate. Students are responsible for adhering to these deadlines and are advised to deliver their work in good time. The deadline schedule for the purpose of graduation is as follows (where t is the graduation date and the numbers refer to the number of days prior to graduation) as shown on Table 1.1.

1.8.5 Thesis Defense (Oral Examination Procedure)

The examiner is selected by the Department Head in consultation with the supervisor(s). The choice of examiner needs to be approved by the Director of Graduate Studies. The examiner shall have the qualifications necessary to supervise the thesis, but must not have collaborated in the project on which the thesis is based and must fulfil the rules of Reykjavík University on impartiality of examiners. The oral

Final draft of thesis delivered to supervisor ^a	$t - 50^b$
Supervisors comments delivered to student	$t - 40^{c,d}$
Thesis delivered to supervisor(s), examiner and department head ^a	$t - 20^c$
Examiner confirms that thesis may be put up for defense	$t - 17^c$
Defense	$t - 14^c$
Grade posted to the Registrar by SSE office	$t - 11^c$
Graduation	t^c

^a Paper and/or electronic form, as requested by the supervisor(s) and/or examiner.

^b Date can be modified by mutual agreement of the supervisor, student and examiner.

^c Firm deadlines.

^d Or within 10 days after the supervisor has received the final draft, whichever comes first.

^e Or within 5 days after the defence, whichever comes first.

Table 1.1: Schedule for thesis according to expected graduation date.

examination shall be open to the public and shall be announced through appropriate channels with at least 3 days notice. The examination should take the form of an approximately 30 minute presentation by the student, followed by questions from the examiner, School representative (most often the Department Head), supervisor(s) and the audience. The audience then leaves the room and the examiner(s), supervisor and School representative have the opportunity to put further questions to the candidate and, as appropriate, request modifications to the thesis. Subsequently, the candidate leaves the room and the examiner, School representative and supervisor(s) deliberate and decide upon the grade. Normally, the student will be informed of the grade the next day. If the thesis is subject to confidentiality, or for other valid reasons approved by the Director of Graduate Studies, the oral examination may be closed to the public.

1.8.6 Grading

The appointed examiner shall evaluate the thesis and the oral defense of the thesis, together with the supervisor(s) and the department's representative. One grade shall be awarded for the thesis and defence. The minimum passing grade is 6.0, see Guidelines for grading MSc theses in the appendix. The following factors shall be taken into account:

- Significance and originality of work
- Scientific and technological challenge and results

- Methodological quality
- Presentation

The number of ECTS credits awarded for the Masters project shall be taken into account. Thus, significantly more demands in terms of originality, quantity and scientific quality of the work should be placed on the student for a 60 ECTS thesis than a 30 ECTS thesis.

1.8.7 Guidelines for grading MSc thesis (English)

The guidelines below describe typical projects in different grading brackets. This is meant for examiners and instructors in grading masters theses. The projects need not fulfil every aspect of these descriptions in order to be awarded the corresponding grade.

Superior (9,0-10,0) The project is excellent. The handling of the material shows considerable originality and independent thought. Considerable skill in the definition and organized solving of the problem. Very good understanding of concepts. Academic approach and handling of material. Exemplary methods in collection and processing of data. Use of references is very precise and supports the projects well. The thesis may well lead to a publishable article. Exceptionally well polished thesis with very good grammar, spelling and language use. The thesis is in English. The students performance in the defense is excellent.

First grade (7,5-8,5) The project is very good and handling of material is good and somewhat original. Clear understanding of the material and the definition of the problem is good and the solving well organized. Data gathering and processing without major weaknesses and intelligent use of references. The thesis is well arranged and grammar, spelling and language is good. The students performance in the defense is either good or very good.

Second grade (6,0-7,0) The project is acceptable. Handling of material is fair and some independent thinking. Definition and analysis of project reflects some understanding. Data collection and processing is without major flaws. Deficiencies in the literature review. Flaws have not been addressed despite the instructors suggestions. Language, grammar and spelling is fair. The students performance in the defense is fair.

Fail (1,0-5,5) The project is unacceptable. The project has major flaws that have not been addressed despite the instructors suggestions. Limited understanding of the material. Definitions and analysis do not show understanding of what is relevant in solving the problem at hand. Major errors or misunderstanding.

Data collection and analysis has deficiencies and literature review is weak. The subject is not adhered to or major inconsistencies. Language, grammar and spelling is fair or poor. The students performance in the defense is fair or poor.

1.8.8 Viðmið fyrir einkunnagjöf

Eftirfarandi er lýsing á dæmigerðum verkefnum í mismunandi einkunnabilum sem er ætluð til stuðnings fyrir frófdómara og leiðbeinendur við mat á MSc verkefnum. Lýsingin þarf ekki að eiga við verkefnið í öllum atriðum til að verkefnið geti hlotið vipkomandi einkunn.

Ágætiseinkunn (9,0 – 10,0) Verkefni er afburðagott. Efnistöð engdurspegla umtalsverðan frumleika og sjálfstæði í hugsun. Umtalsverð færni í skilgeiningu og skipulegri úrlausn viðfangsefnisins. Mjög góður skilningur á hugtökum. Visindaleg ntlgun of efnistöð. Fyrirmyndar vinnugrögð við öflun og úrvinnslu gagna. Heimildanotkun mjög nákvæm og styður vel við verkefnið. Ætla má að ritgerðin geti leitt til birtingarhæfrar greinar. Frágangur sérlega góður og stafsetning og málfar mjög gott. Ritgerðin er skrifuð á ensku. Frammistaða nemanda í vörninni afburðagóð.

1. einkunn (7,5 – 8,5) Verkefnier mjög gott og efnistöð góð og nukkuð fruleg. Skýr skilningur á viðfangsefninu og góð færni í skilgreininngu þess og skipulegri úrlausn. Vinnubrögð við öflun og úrvinnslu gagna án verulegra veikleika og heimildanotkun skynsamleg. Frá gagnur góður og stafsetning og málfar gott. Frammistaða nemanda í vörninni góð eða mjög góð.

2. einkunn (6,0 – 7,0) Verkefnið er þokkalegt. Allgöð efnistöð og sjálfstæð hugsun á köflum. Skilgreining og úrvinnsla viðfangsefnis endurspegla nokkurn skilning á viðfangsefninu. Öflun og úrvinnsla gagna án verulegra galla. Heimildanotkun nokkuð áfátt. Finna má galla sem ekki hafa verið lagfærðir þrátt fyrir ábendingar leiðbeinanda. Málfar og stafsetning þoggaleg. Frammistaða nemanda í vörninni þokkaleg.

Falleinkunn 0,0 – 5,5 Verkefni fullnægir ekki lágmarkskröfum. Verkefnið hefur áberandi galla sem ekki hafa verið lagfærðir þrátt fyrir ábendingar leiðbeinanda. Takmarkaður skilningur á viðfangsefninu. Skilgreining og úrlausn viðfangsefnis sýnir ekki nægilega góða tilfinningu fyrir því hvað skitip máli við lausn þess. Verulegar villur eða misskilningur. Öflun og úrvinnsla gagna er töluvert áfátt sem og heimildanotkun. Farið út fyrir efnistöð eða umtalsverð ósamkvæmni. Málfar og stafsetning sæmileg eða slök. Frammistaða nemanda í vörninni sæmileg eða slök.

1.9 PhD Special Instructions

Final Preparation for PhD Dissertations:²

1. Send PDF to Administrative person Sigrún Þorgeirsdóttir <sigrunth AT ru.is>
2. Talk to one of the printing companies in Iceland and ask if they can do a B4 booklet with a printed cover.
3. Make clear which elements are the outside cover and which are the inside contents. **You want to make sure they don't print a copy of the cover inside the book.**
4. They will insert your signature pages into the PDF and start the printing process; The paper you want is archival-quality acid-free 240×170 mm (aka B5, Programme, or Book Economy).
5. If you can, get a proof of the print to check that the layout is correct and the quality is acceptable, particularly any figures.
6. If is acceptable, then get them to print out the required number of copies.
7. Finally bring the copies to head of graduate studies(Eyjolfur Ingi Ásgeirsson <eyjolfur AT ru.is> or TD Person), who should forward them as appropriate.

1.10 BSc Programs

- Bioinformatics, Biomedical Engineering
- Civil Engineering with specialization in Concrete Technology
- Civil Engineering with specialization in Construction Management
- Civil Engineering with specialization in Structural Design
- Civil Engineering with specialization in Transport and Urban Planning
- Construction Management
- Electrical Engineering
- Mechatronics
- Engineering Management
- Exercise Science and Coaching

²Always refer to the website in case details have changed

- Financial Engineering
- Mechanical Engineering
- Sustainable Energy Engineering
- Sustainable Science
- Urban Planning and Transport

1.11 MSc Additional Material

- Cover pages, front and back (standard, provided by SSE)
- Example of a front page (text to appear in window on front cover page)
- Example of a title page
- Example of a signature page
- List of MSc degrees awarded

1.11.1 List of Degrees Awarded

Master of Science in Biomedical Engineering
 Master of Science in Civil Engineering
 Master of Science in Electrical Engineering
 Master of Science in Engineering Management
 Master of Science in Exercise Science and Coaching
 Master of Science in Financial Engineering
 Master of Science in Mechanical Engineering
 Master of Science in Sustainable Energy Engineering — ISE
 Master of Science in Sustainable Energy — ISE

Meistarapróf (MSc) í heilbrigðisverkfræði
 Meistarapróf (MSc) í byggingarverkfræði
 Meistarapróf (MSc) í rafmagnsverkfræði
 Meistarapróf (MSc) í rekstrarverkfræði
 Meistarapróf (MSc) í íþróttavísindum og
 Meistarapróf (MSc) í fjármálaverkfræði
 Meistarapróf (MSc) í vélaverkfræði
 Meistarapróf (MSc) í orkuverkfræði — ISE
 Meistarapróf (MSc) í orkuvísindum — ISE

1.12 Computer Science Programs

- Computer Science
- Software Engineering
- Language Technology

1.12.1 LaTeX Generated file extensions

These are the files that \LaTeX generates when you run it. If you are using SVN or another version control system, you want to tell that system to ignore these files:

```
*-blx.bib
*.acr
*.acn
*.alg
*.aux
*.bak
*.bb1
*.bcf
*.blg
*.bst
*.dvi
*.glo
*.gl*
*.idx
*.ind
*.ilg
*.ist
*.lo?
*.mw
*.nlo
*.ntn
*.out
*.pdf
*.ps
*.rel
*.run.xml
*.sbl
*.slg
*.snm
*.sym
*.synctex.gz
*.tcp
*.thm
*.tdo
*.to?
*.tmp
*.tmpproj
```

```
*.xwm  
.*  
._.DS_Store  
.*lock*  
auto  
Thumbs.db
```


Part II

Demonstration

Chapter 2

Introduction

State the objectives of the exercise. Ask yourself: Why did I design/create the item? What did I aim to achieve? What is the problem I am trying to solve? How is my solution interesting or novel?

2.1 Background

Provide background about the subject matter (e.g. How was morse code developed? How is it used today?).

This is a place where there are usually many citations. It is suspicious when there is not. Include the purpose of the different equipment and your design intent. Include references to relevant scientific/technical work and books. What other examples of similar designs exist? How is your approach distinctive?

If you have specifications or related standards, these must be described and cited also. As an example, you might cite the specific RoboSub competition website (and documents) if working on the lighting system for an AUV[2]

x	x^2
1	1
2	4
3	9

Table 2.1: Table of squared numbers



Figure 2.1: Reykjavík University Logo, used with permission.

2.2 Example Section

There is an RU logo in Figure 2.1. This logo will scale according to the width of the text on the page. There is a helpful list of squared numbers in Table 2.1. This table is formatted in the style of a book, which is very different than the style one is used to in Excel.

The test text “Lorem Ipsum” is from an ancient text from 45 B.C. [3, 4]

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ip-

sum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consectetur.

2.2.1 Subsection

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

Sed commodo posuere pede. Mauris ut est. Ut quis purus. Sed ac odio. Sed vehicula hendrerit sem. Duis non odio. Morbi ut dui. Sed accumsan risus eget odio. In hac habitasse platea dictumst. Pellentesque non elit. Fusce sed justo eu urna porta tincidunt. Mauris felis odio, sollicitudin sed, volutpat a, ornare ac, erat. Morbi quis dolor. Donec pellentesque, erat ac sagittis semper, nunc dui lobortis purus, quis congue purus metus ultricies tellus. Proin et quam. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Praesent sapien turpis, fermentum vel, eleifend faucibus, vehicula eu, lacus.

Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetur at, consectetur sed, eleifend ac, lectus. Nulla

facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

Morbi luctus, wisi viverra faucibus pretium, nibh est placerat odio, nec commodo wisi enim eget quam. Quisque libero justo, consectetur a, feugiat vitae, porttitor eu, libero. Suspendisse sed mauris vitae elit sollicitudin malesuada. Maecenas ultricies eros sit amet ante. Ut venenatis velit. Maecenas sed mi eget dui varius euismod. Phasellus aliquet volutpat odio. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque sit amet pede ac sem eleifend consectetur. Nullam elementum, urna vel imperdiet sodales, elit ipsum pharetra ligula, ac pretium ante justo a nulla. Curabitur tristique arcu eu metus. Vestibulum lectus. Proin mauris. Proin eu nunc eu urna hendrerit faucibus. Aliquam auctor, pede consequat laoreet varius, eros tellus scelerisque quam, pellentesque hendrerit ipsum dolor sed augue. Nulla nec lacus.

Suspendisse vitae elit. Aliquam arcu neque, ornare in, ullamcorper quis, commodo eu, libero. Fusce sagittis erat at erat tristique mollis. Maecenas sapien libero, molestie et, lobortis in, sodales eget, dui. Morbi ultrices rutrum lorem. Nam elementum ullamcorper leo. Morbi dui. Aliquam sagittis. Nunc placerat. Pellentesque tristique sodales est. Maecenas imperdiet lacinia velit. Cras non urna. Morbi eros pede, suscipit ac, varius vel, egestas non, eros. Praesent malesuada, diam id pretium elementum, eros sem dictum tortor, vel consectetur odio sem sed wisi.

2.2.1.1 SubSubsection

Sed feugiat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Ut pellentesque augue sed urna. Vestibulum diam eros, fringilla et, consectetur eu, nonummy id, sapien. Nullam at lectus. In sagittis ultrices mauris. Curabitur malesuada erat sit amet massa. Fusce blandit. Aliquam erat volutpat. Aliquam euismod. Aenean vel lectus. Nunc imperdiet justo nec dolor.

Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetur tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

Aliquam lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elementum, magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, vestibulum ut, massa. Fusce ultrices nulla et nisl.

Etiam ac leo a risus tristisque nonummy. Donec dignissim tincidunt nulla. Vestibulum rhoncus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimentum augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet sed, pellentesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec pede. Proin mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam lobortis, metus quis elementum commodo, nunc lectus elementum mauris, eget vulputate ligula tellus eu neque. Vivamus eu dolor.

Nulla in ipsum. Praesent eros nulla, congue vitae, euismod ut, commodo a, wisi. Pellentesque habitant morbi tristisque senectus et netus et malesuada fames ac turpis egestas. Aenean nonummy magna non leo. Sed felis erat, ullamcorper in, dictum non, ultricies ut, lectus. Proin vel arcu a odio lobortis euismod. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Proin ut est. Aliquam odio. Pellentesque massa turpis, cursus eu, euismod nec, tempor congue, nulla. Duis viverra gravida mauris. Cras tincidunt. Curabitur eros ligula, varius ut, pulvinar in, cursus faucibus, augue.

2.3 Section with a very long name

Sed feugiat. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Ut pellentesque augue sed urna. Vestibulum diam eros, fringilla et, consectetur eu, nonummy id, sapien. Nullam at lectus. In sagittis ultrices mauris. Curabitur malesuada erat sit amet massa. Fusce blandit. Aliquam erat volutpat. Aliquam euismod. Aenean vel lectus. Nunc imperdiet justo nec dolor.

Etiam euismod. Fusce facilisis lacinia dui. Suspendisse potenti. In mi erat, cursus id, nonummy sed, ullamcorper eget, sapien. Praesent pretium, magna in eleifend egestas, pede pede pretium lorem, quis consectetur tortor sapien facilisis magna. Mauris quis magna varius nulla scelerisque imperdiet. Aliquam non quam. Aliquam porttitor quam a lacus. Praesent vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

Aliquam lectus. Vivamus leo. Quisque ornare tellus ullamcorper nulla. Mauris porttitor pharetra tortor. Sed fringilla justo sed mauris. Mauris tellus. Sed non leo. Nullam elementum, magna in cursus sodales, augue est scelerisque sapien, venenatis congue nulla arcu et pede. Ut suscipit enim vel sapien. Donec congue. Maecenas urna mi, suscipit in, placerat ut, vestibulum ut, massa. Fusce ultrices nulla et nisl.

Etiam ac leo a risus tristisque nonummy. Donec dignissim tincidunt nulla. Vestibulum rhoncus molestie odio. Sed lobortis, justo et pretium lobortis, mauris turpis condimentum augue, nec ultricies nibh arcu pretium enim. Nunc purus neque, placerat id, imperdiet sed, pellentesque nec, nisl. Vestibulum imperdiet neque non sem accumsan laoreet. In hac habitasse platea dictumst. Etiam condimentum facilisis libero. Suspendisse in elit quis nisl aliquam dapibus. Pellentesque auctor sapien. Sed egestas sapien nec lectus. Pellentesque vel dui vel neque bibendum viverra. Aliquam porttitor nisl nec pede. Proin mattis libero vel turpis. Donec rutrum mauris et libero. Proin euismod porta felis. Nam lobortis, metus quis elementum commodo, nunc lectus elementum mauris, eget vulputate ligula tellus eu neque. Vivamus eu dolor.

Nulla in ipsum. Praesent eros nulla, congue vitae, euismod ut, commodo a, wisi. Pellentesque habitant morbi tristisque senectus et netus et malesuada fames ac turpis egestas. Aenean nonummy magna non leo. Sed felis erat, ullamcorper in, dictum non, ultricies ut, lectus. Proin vel arcu a odio lobortis euismod. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Proin ut est. Aliquam odio. Pellentesque massa turpis, cursus eu, euismod nec, tempor congue, nulla. Duis viverra gravida mauris. Cras tincidunt. Curabitur eros ligula, varius ut, pulvinar in, cursus faucibus, augue.

Nulla mattis luctus nulla. Duis commodo velit at leo. Aliquam vulputate magna et leo. Nam vestibulum ullamcorper leo. Vestibulum condimentum rutrum mauris. Donec id mauris. Morbi molestie justo et pede. Vivamus eget turpis sed nisl cursus tempor. Curabitur mollis sapien condimentum nunc. In wisi nisl, malesuada at, dignissim sit amet, lobortis in, odio. Aenean consequat arcu a ante. Pellentesque porta elit sit amet orci. Etiam at turpis nec elit ultricies imperdiet. Nulla facilisi. In hac habitasse platea dictumst. Suspendisse viverra aliquam risus. Nullam pede justo, molestie nonummy, scelerisque eu, facilisis vel, arcu.

Curabitur tellus magna, porttitor a, commodo a, commodo in, tortor. Donec interdum. Praesent scelerisque. Maecenas posuere sodales odio. Vivamus metus lacus, varius quis, imperdiet quis, rhoncus a, turpis. Etiam ligula arcu, elementum a, venenatis quis, sollicitudin sed, metus. Donec nunc pede, tincidunt in, venenatis vitae, faucibus vel, nibh. Pellentesque wisi. Nullam malesuada. Morbi ut tellus ut pede tincidunt porta. Lorem ipsum dolor sit amet, consectetur adipiscing elit. Etiam congue neque id dolor.

Donec et nisl at wisi luctus bibendum. Nam interdum tellus ac libero. Sed sem justo, laoreet vitae, fringilla at, adipiscing ut, nibh. Maecenas non sem quis tortor eleifend fermentum. Etiam id tortor ac mauris porta vulputate. Integer porta neque vitae massa. Maecenas tempus libero a libero posuere dictum. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Aenean quis mauris sed elit commodo placerat. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Vivamus rhoncus tincidunt libero. Etiam elementum pretium justo. Vivamus est. Morbi a tellus eget pede tristisque commodo.

Nulla nisl. Vestibulum sed nisl eu sapien cursus rutrum.

2.4 Another Section

Part III

The Second Part

Bibliography

- [1] D. Adams, *So long, and thanks for all the fish*. Harmony Books, 1984.
- [2] J. Guls, Ólafur Ingi Bjarnason, Óskar Pétursson, S. Örn Einarsson, and J. T. Foley, “Application of Axiomatic Design in designing autonomous underwater photography lighting,” in *10th International Conference on Axiomatic Design (ICAD)*, A. Liu, Ed., vol. 35, Procedia CIRP. Xi’an, Shaanxi, China: Elsevier ScienceDirect, 2016, p. 6, sep. 21–23.
- [3] Cicero, “de finibus bonorum et malorum (the extremes of good and evil),” -45, section 1.10.32.
- [4] Unknown, “Lorem ipsum website.” [Online]. Available: www.lipsum.com

Appendix A

Code

You can put code in your document using the `listings` package, which is loaded. Be aware that the `listings` package does not put code in your document if you are in draft mode unless you give it the `final` option.

There is an example java (Listing A.1) and XML file (Listing A.2). Thanks to the `url` package, you can typeset OSX and unix paths like this: `/afs/rnd.ru.is/project/thesis-template`. Windows paths: `C:\windows\temp\`. Note: The `menukey` package has similar functionality but may cause problems.

If you are trying to include multiple different languages, you should go read the documentation and set these up as below. You will save yourself a lot of effort, especially if you have to fix anything.

Listing A.1: `Data_Bus.java`: Setting up the class.

```
1 package com.example.mycoolapp;

3 import android.app.Activity;
  import android.content.Intent;
5 import android.os.Bundle;
  import android.view.View;
7 import android.widget.Button;
  import android.widget.TextView;
9
  // I am creating a comment that is very very long to demonstrate how the line ↵
  ↵ wrapping system works. You should see a symbol to annotate that it has been ↵
  ↵ wrapped to the next line.
11 public class Data_Bus extends Activity {
    Button Next;
13    TextView textdisplay1, textdisplay2;
```

```
15  @Override
16  protected void onCreate(Bundle savedInstanceState) {
17      // TODO Auto-generated method stub
18      super.onCreate(savedInstanceState);
19      setContentView(R.layout.adc_databustest);
20      Next = (Button) findViewById (R.id.checkButton);
21      textdisplay1 = (TextView) findViewById (R.id.tvTop);
22      textdisplay2 = (TextView) findViewById (R.id.tvBottom);
23
24  }
25 }
```

Listing A.2: AndroidManifest.xml: Configuration for the Android UI.

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3      package="com.example.mycoolapp"
4      android:versionCode="1"
5      android:versionName="1.0" >
6
7      <uses-sdk
8          android:minSdkVersion="13"
9          android:targetSdkVersion="13" />
10
11     <application
12         android:allowBackup="true"
13         android:icon="@drawable/ic_launcher"
14         android:label="@string/app_name"
15         android:theme="@style/AppTheme" >
16
17         <activity
18             android:name=".MainActivity"
19             android:label="@string/app_name" >
20             <intent-filter>
```
