

Information and requirements concerning Theses and Interdisciplinary Projects carried out at the Chair of Geosensors and Engineering Geodesy¹

(Last revision: 02/2022)

The following information is mandatory for all students working on a Bachelor Thesis (BT), Interdisciplinary Project (IP) or Master Thesis (MT) supervised by members of the Chair of Geosensors and Engineering Geodesy (GSEG). Different arrangements may be made in written form by mutual agreement between the supervisors and the student(s), provided that they are compatible with the regulations of the degree programs "Geomatics and Planning" or "Geomatics" of the D-BAUG.

All demands of Good Scientific Practice are to be fulfilled under the terms of the Guidelines of Research Integrity² at the ETH Zurich. The students have to familiarize themselves with these guidelines before starting their thesis and/or project.

1. Products to be delivered

1. **Written Concept** (electronically; initial position, objectives, methods, approaches, milestones, basic data, possible intermediate or final results, schedule, etc.) including sketches, tables, images, etc. (Extent: 2-4 pages; with name of the student and date of submission).
2. **Report** (printed; see section «Report», 1 copy).
3. **A0-Poster** (only for MT and IP; template will be provided by the supervisor).
4. **Presentation** (see section «Presentation»).
5. **Short Report for Webpage** (approx- 1000 – 2000 characters, 1 – 2 figures).
6. **End products** (if applicable; e.g.: software).
7. **Delivery folder on gsgstud** containing the following files (including clearly arranged and meaningfully named folders, subfolders and structuring):
 - Table of contents of the folder as a html or pdf file (structure of the folders, short explanation dealing with all relevant files)
 - (1)-(5) as PDF format and editable original format (Word, Powerpoint, Latex or similar)
 - Digital end products (if applicable; editable original format and directly usable version – e.g. software: well-documented source code + executable).
 - Basic information, data (initial or raw, intermediate products, image files, etc., such that results can be reproduced with the help of the written report, referenced software and the digital end products and photos for purposes of public relations, courses and publications).

2. Report

The report should satisfy the demands of a scientific work. Structure and language should be chosen accordingly.

The report's ultimate goal is (a) to **make objectively traceable and repeatable the results of the work** and to (b) **document any new findings**. It must be clear at any point in the report, which facts, sources or research results the author of the report has drawn from other authors to derive the conclusions stated in the report and which insights or findings are her/his original contributions. Experiments or measurements and the derived results must be described in such a way that they can be reproduced equivalently. All sources used for the work must be referenced correctly.

When writing the report the following aspects and conditions should be considered and respected.

¹ This document is based on a similar one issued by ICG (M. Raubal, L. Hurni, FS 2015). For better readability, even sections quoted literally are not marked in the usual way.

² <https://www.ethz.ch/content/dam/ethz/main/research/pdf/forschungsethik/Broschure.pdf>

Extent

Approximately 30 – 80 pages (depending on topic and type of assignment).

Layout

Can be chosen freely; should respect typographic rules and should be optimized for printout on DIN A4 paper (one sided print, font for continuing text 10-12pt).

Contents of the report

- Title page including:
Title of the thesis/project, semester of study, course of study, type of assignment, name and email address of the author, lead, institute, date of submission, official ETH logo)
- Acknowledgement (if required: sponsors, external supervisors, assistants, ...)
- Summary (max 1 page. Task, methodology, main results)
- Table of contents
- List of abbreviations (if more than about 10 abbreviations are used)
- Main section (see below)
- References and bibliography (see below)
- Appendices (if needed)
- A signed declaration of originality using the standard ETH form³

Rough structure of the main part (example)**1. Introduction**

- Introduction and problem statement
- Objective (detailed, clear and unambiguously formulated; possibly with sub-objectives)
- Summary of the content (description of the structure of the report: sequence of chapters, how the chapters are interrelated and what is their essential content)

2. Theoretical foundations, methods and approach

- Initial position (theory, state of the art, previous work).
- Basic data (names, origin, content, format, etc.).
- Equipment (instruments, sensors, software, etc.).
- Selected methods (including brief discussion of alternative approaches).
- Procedure (process steps, milestones, intermediate results).

3. Results

- Presentation, interpretation and critical evaluation of the results
- Generalization of exemplary results to more general cases (if applicable)

4. Conclusions and outlook

- Summary problem statement – methods – main results
- Critical evaluation of achievements and relevance under consideration of previously formulated goals
- Recommended and required future work

5. References

- All used respectively mentioned in the text, which are not specified in a footer (see section 3, bottom)

³ For the official form see: <https://www.ethz.ch/studierende/de/studium/leistungskontrollen/plagiate.html> (German), <https://www.ethz.ch/students/en/studies/performance-assessments/plagiarism.html> (English)

6. Appendix

- After consulting the supervisors: additional figures, detailed charts, short description of constructed software etc.
- In case of group work: list of contributions of each group member of respective work and of the written report
- The signed and completely filled-in declaration of originality³ (compulsory)

While "Introduction" and "conclusions" should be the first and last chapter, respectively, of the main part in any work, the other parts can be divided into two or more chapters according to the task, methods and characteristics of the work. However, the critical discussion and assessment (e.g. graphically presented as time series) of results should never be separated from the presentation of these results. The structure of the report should be discussed and agreed with the supervisor before starting the manuscript preparation.

3. Handling sources and references

It needs to be clear, which parts of the report have been worked out exclusively by the author and which parts, data or conclusions were drawn from other sources. Most likely at least the sections dealing with introductory issues and theoretical foundations are based on previous work from other authors. The sources in question are to be provided at those spots in the text, where their content is used together with a specification of the extracted information.

Common knowledge or methods, definitions and conventions used by a large part of the scientific community do not need to be referenced, if the reader can be trusted to be familiar with them (e.g.: dispersive properties of the atmosphere with regard to propagation paths of waves, matrix algebra, Fourier transforms, velocity of light in vacuum). New or probably unfamiliar methods and aspects are to be supported by sources; if the original source is not too outdated it should be given priority, otherwise and especially for more established methods and knowledge, standard textbooks are favorable sources. **References to student theses, lecture notes**, or secondary sources are to be avoided. If possible, the cited sources should be accessible and legible for the potential reader. If the source is a technical report, bachelor's thesis, master's thesis or a non-English publication in language differing from the language of the report it should be substituted by publicly available material, if such an alternative exists; of course the corresponding source still needs to be given as a reference if it is the only source, despite its type, availability or language.

It is recommended to use the parenthetical referencing (Harvard style) and consider the following special features:

Quotations

An article in a scientific journal or a book is quoted as follows:

Even back in the 50's, first programs for analytical shading have been developed (Yoëli, 1959).

If the author is to be explicitly highlighted, the following notation can be used:

Even as early as the 50's, Yoëli (1959) developed a program for analytical shading.

If the quote refers to a specific spot in a book that would otherwise not be easy to find for the reader, the page is also indicated; if there are multiple pages, the prefix "pp." Instead of "p." precedes the page number:

The algorithm can be found in Niemeier (2008, pp. 201).

If two authors contributed to a source, both names are listed and separated by „and“. When referencing a source with more than two authors, the first author is mentioned and the words "et al." (short version of et alii) are appended:

A 3D map is not a map in the strict sense but a map-related presentation (Hake et al., 2002).

Webpages should only be used as a reference when there are no printed or electronic, but static and clearly identifiable documents for the facts in question. In this case, the website should be indicated in a footnote, including access date, for example:

For testing purposes, a board with dimension 13 x 13 cm² consisting of Spectralon¹ was used, that ...

...

¹<http://www.labsphere.com/products/reflectance-standards-and-targets/spectralon-reflectance-standards/diffuse-reflectance-standards.aspx> (accessed: 21.1.2015)

Literal quotations

If the source is cited verbatim, the passage quoted needs to be reproduced faithfully. Omission of one or more words is marked with [...]; other changes are also indicated with "[" and "]". For referencing purposes, the page number of the page containing the quoted passage is to be included:

«The purpose of computing is insight, not numbers.» (Hamming, 1962, p.1).

Reference section (or bibliography)

All quoted or mentioned articles and books are documented in the reference list (formerly called bibliography) at the end of the work. Information sources of a more general nature such as dictionaries, User Manuals for instruments or programs are not listed in the reference section (unless they are specifically analyzed as part of the thesis/project); if a reference to it is unavoidable (for example, because an algorithm or argument is explained only there), it should be given as a footnotes.

Depending on the source, different information is required in its entry in the reference section. The following examples show the corresponding references for common cases:

Example 1: Articles in Journals

Yoëli P (1959) Relief Shading. *Surveying and Mapping*, 19 (2), 229–232.

The entry consists of (1) surname, (2) initials of the first and middle names, (3) the year of publication in parentheses, (4) title of the article, (5) the name of the journal (6) issue of the Journal (volume and number) and (7) page numbers. After the title, there is a dot, otherwise, where necessary, a comma as a separator. If there is more than one author, the surname and initials of all authors are listed one after the other and separated by commas before the year:

Andrienko G, Andrienko N, Demšar U, Dransch D, Dykes J, Fabrikant S, Jern M, Kraak M-J, Schumann J, Tominski C (2010) Space, Time, and Visual Analytics. *International Journal of Geographical Information Science*, 24 (10), 1577–1600.

Example 2: Book

Oppenheim AV, Schafer RW (2013) *Discrete-Time Signal Processing*. 3rd ed, Pearson Education, Harlow, 1052 p.

The entry consists of (1) surname and initials of the First and middle names of all authors, (2) the year of publication, (3) title of the book, (4) edition (if >1), (5) publisher, (6) location of publication and (7) number of pages.

Example 3 : Article in an edited book (chapters contributed by various authors)

Robinson AH (1974) A New Map Projection: Its Development and Characteristics. In: Kirschbaum G M, Meine K-H (ed.) *International Yearbook of Cartography*. Kirschbaum, Bonn, 145–155.

The entry consists of (1) the surname and initials of the first names of all authors, (2) the year of publication, (3) title of the chapter / article (4) "In:" (5) surname and initials of the first name of the editor, (6) "(ed)", (7) the name of the book, (8) publishing (9) place of publication, (10) pages of the chapter / article.

Example 4: Dissertations

Donaubauer A (2004) *Interoperable Nutzung verteilter Geodatenbanken mittels standardisierter Geo Web Services*. Dissertation, Technical University Munich, Munich, Germany.

The entry consists of (1) surname and initials of the first and middle name of the author, (2) the year of publication, (3) Title of the thesis, (4) "dissertation", (5) the name of the university, (6, 7) Location and country associated to the university.

Example 5: Technical reports

Technical reports which are publicly accessible (e.g. through the internet) are referenced like dissertations:

Allan DW, Ashby N, Hodge CC (1997) The Science of Timekeeping. Application Note 1298, Hewlett Packard, Englewood, CO, USA.

The entry consists of (1) surname and initials of the first and middle names of the authors, (2) the year of publication, (3) Title of the report (4) Type / series and number of the report, (5) the name of the organization, (6, 7) place and country of the organization.

Technical Reports, which are not generally and readily available (e.g. internal reports of an organization, reports of students from projects or study-related works) should only be referenced when there is no other suitable generally available reference instead.

Example 6: Proceedings

Jordan T, Raubal M, Gartrell B, Egenhofer M (1998) An affordance-based model of place in GIS. Proceedings 8th International Symposium on Spatial Data Handling, Vancouver, July 11-15, IUG, 98–109.

The entry consists of (1) the surname and initials of the first names of the authors, (2) the year of publication, (3) Title of the article, (4) "Proceedings", (5) the name of the conference or symposium, (6) Place of conference, (7) the date of the conference (8) (optional) Name of the organizer or publisher (9) (optional) City of publisher, (10) pages of the article.

4. Feedback on report before final submission

For a Bachelor's or Master's thesis, the student is strongly encouraged to get feedback on parts of the report before final submission. This feedback is performed in four phases:

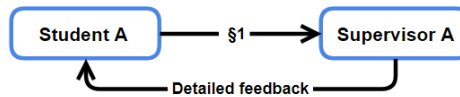
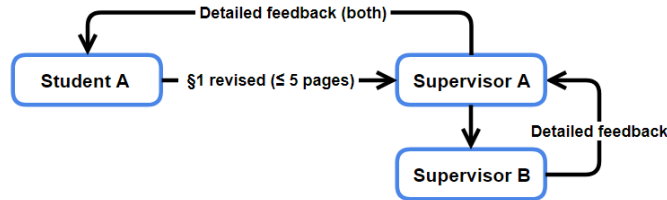
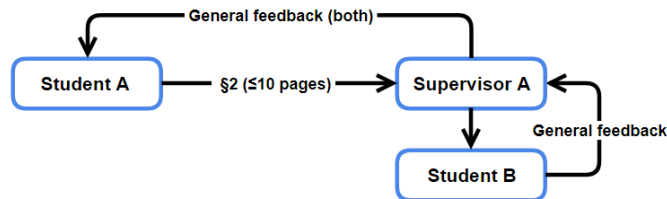
Structure: The student should prepare an outline of the structure of the intended report comprising the chapter headings and anticipated subchapters before starting to write the content of the report. The structure should be compiled like a table of contents and should contain also rough estimates of the respective number of pages. The supervisor will give feedback on this structure.⁴

Review 1: The student should first prepare a complete chapter of the report and submit it to the supervisor, who provides detailed feedback on both content and form. The submitted version should therefore be complete in terms of language and content. This review will provide the student with some general guidelines to extrapolate to the remainder of the report.

Review 2: The student should revise the chapter following the feedback received from Review 1 and resubmit a section of it (max. 5 pages) to the supervisor. This section is reviewed by the supervisor and – independently – by another scientific member of the Chair (chosen and approached by the supervisor). The student receives detailed feedback from both reviewers. This review will help the student to clarify whether the general guidelines have been correctly derived from Review 1 while additionally allowing to identify common correctness criteria aside from specific preferences of the supervisor.

Review 3: Following the previous reviews, the student submits a part (max. 10 pages) of another chapter to the supervisor. This part will be reviewed by both the supervisor and if possible a peer student (other student carrying out a bachelor's or master's thesis or a project at the same Chair, and approached by the respective supervisor). General (not detailed) feedback will be provided by both reviewers. This review will provide a final assessment on the preparation criteria while giving the student an external perspective on report evaluation. The student has to act himself/herself as a reviewer for at least one other student of the chair if approached by the supervisor. If only one student is working on her/his thesis at the Chair in the given semester, the Review 3 will only be performed by the supervisor. In this case we strongly recommend that the student arranges himself/herself for a mutual review of parts with another student.

⁴ Like any plan, this version of the structure is not binding, and the student should feel free to adapt it as needed while composing the final report, if there are good reasons to do so.

Review 1:**Review 2:****Review 3:**

5. Presentation

Bachelor's and Master's thesis

Each student independently presents his/her thesis in an oral presentation. Date and time are fixed by the study administration and director of studies in coordination with the thesis supervisors. Details are communicated to the student by the respective supervisor. Students are expected to also attend the presentations of their fellow students irrespective of supervising professorship.

Interdisciplinary project

The presentation of the project consists of two parts: (a) a brief oral presentation, and (b) a poster. Both are given within a closing event with poster exhibition, open to the public, during which each team presents its own project (one brief oral presentation and one poster per team). Date, place, time and structure of the closing event will be fixed by the Director of Studies before the start of the semester and will be communicated to the supervisors through Study Administration. The supervisors are responsible for communicating this time to the students. All members of the project teams are obliged to participate in the closing event. All students of Geomatics (MSc) and Geomatic Engineering and Planning (BSc) will be notified and invited by the Study Administration Office to attend the event.

6. Meetings regulation

Supervision is carried out through fixed and on-demand meetings (see section 9 for relevant dates), consisting of: kick-off meeting, discussion of concept, intermediate presentation and weekly update meetings with the supervisor. A brief protocol should be recorded by the student after each meeting and shared with the supervisor to help keeping track of progress and open issues.

7. Assessment criteria

The following criteria are used for the assessment of the theses and interdisciplinary projects supported by this Chair.

The final grade is made up of five sub-scores, which are weighted differently. The following list describes how the individual grades are assembled and weighted. If content and aim of the assignment deviate clearly from structure and content assumed in this document some weightings may be supplemented, modified or omitted completely by way of exception. If in doubt, it is necessary to seek clarification by discussing the issue with the respective supervisors during the first two weeks of the work on the assignment.

Sub-scores will be rounded to half integers. The final grade will be rounded to quarter integers.

Criterion 1: Concept (Weight: 1)

- Comprehension of issues and objectives
- Workflow and milestones

Criterion 2: Practical Implementation (Weight: 2)

- Methodology: Development of solutions, application of methods, implementation and testing of methods
- Field / laboratory work (if part of the assignment): Selection of instruments, preparation and field operations, quality of execution, quality of documentation
- Results: quality / functionality / generalizability of the results
- Possible impact on the research community
- Documentation of raw data (when measurements / experiments are performed) and source code (if programming is part of the task or the solution).

Criterion 3: Written report and auxiliary material (Weight: 4)

- Clear and useful structure of the report
- Proper handling of data, citations and references (scientific misconduct may, depending on the severity of the case at hand, lead to a negative assessment of the overall work done on the assignment among other consequences) Constructive use of text, formulas, images, tables etc.
- Consideration of current and relevant literature
- Classification of own work in regard to other research
- Clear description of method, experiments and results
- Critical discussion of the results
- Traceably correct inferences and conclusions
- Grammar, spelling and writing style
- Quality of figures, tables and equations
- Layout and design of the report (readability, clarity)
- Supplementary electronic data: structure, quality and completeness of the comments
- Structure and completeness of the delivery folder

Criterion 4: Presentation (oral and / or poster) (Weight: 1)

- Structure of the presentation
- Focusing on the essentials
- Layout and design
- Comprehensibility of explanations
- Quality of the discussion (replies to posed questions)
- Time management in case of an oral presentation (compliance to the time limits).

Criterion 5: Way of working / Social Skills (Weight: 2)

- Independence, teamwork and communication (e.g. with advisors)
- Initiative
- Personal commitment and dedication
- Project organization

These weights are only valid when a positive evaluation (≥ 4) is obtained for criteria 2 (implementation) and 3 (report). Otherwise, the weight assigned to each criterion with a negative evaluation is increased to 9 while all others are reduced to 1.

8. Usage of data, hardware, and software

For the entire work on the thesis and/or project - including creation of the delivered products - only properly licensed software must be used.

All data, software and hardware provided by the chair during the time of the thesis or project in question continue to be property of ETH Zurich. They may be used only in connection to the thesis. Other use cases like the use after submission of the thesis or disclosure to third parties are prohibited.

If data are obtained from a portal (e.g. from MeteoSwiss or Swisstopo) the students have to accept the respective conditions and terms of use and behave accordingly.

9. Fixed dates 2022

Spring semester 2022

	BT	MT	IP
Official start	21.02.	28.02.	21.02.
Submission of concept	until 04.03.	until 11.03.	until 04.03.
Discussion of concept	until 11.03	until 18.03.	until 14.03
Meetings with supervisor		Upon agreement	
Intermediate presentations		Upon agreement	
Submission for the 1st review	until 29.04	until 20.05	
Presentation of thesis ^{*)}	until 03.06.	until 04.07.	until 03.06.
Submission of report	until 10.06.	until 04.07.	until 10.06.
Submission other deliverables	until 10.06.	until 04.07.	until 10.06.

^{*)}The date of the presentation and the exact procedure (e.g.: oral presentation and/or poster presentations) will be determined in agreement with the Director of Studies or the Admissions Office, and will be communicated separately

10. Contact person in case of organizational issues

In case of organizational issues, the students are expected to consult initially with the supervisor, who will be directing them to the respective authorities if necessary.

11.2.2022 / AW / JB