Instructions and recommendations for preparation of bachelor and master theses

Version: Feb 2016, David Dolejs

General structure, content, format and appearance of student theses may be regulated by study or examination guidelines of the university or faculty, office of the dean and/or by individual departments, where the thesis is completed. Consult these resources prior to starting your work.

ORGANIZATION AND CONTENT OF THE THESIS

Thesis is a result of independent work of the student. Individual parts of the thesis may be based on new original observations, field or laboratory measurements and data, but appropriate credit must be given to previous work in the geographic area and/or scientific field of the study. When results and interpretations are reported, data obtained by reproducible procedures must be carefully separated from inferences, interpretations and hypotheses, which may change with time and knowledge. In other words, methodology and results must be reproducible by anyone and must always yield the same results. By contrast, intepretation reflects opinion, knowledge and deductive abilities of the writer as well as the general state of knowledge.

Compilation part of the thesis should not represent isolated or incoherent paragraphs reflecting detached excerpts from individual publications, but rather a continuous text of the writer who uses his/her own writing style to guide the reader through the problem and creates a continuous story line. He/she appropriately introduces and discusses previous ideas and lead to new open questions and their possible solutions. The goal of compilation is to provide the reader with a general picture of the problem quickly, without the need for locating, reading and evaluating individual papers on his own. The contribution of the writer is seen in connecting und uniformly presenting existing knowledge.

Title page

Data, format and appearance of the title page of the thesis should be identical in the Faculty of Environment and Natural Resources. Please consult the student office and/or previous theses in your field.

Personal declaration

The applicant must declare that the thesis represents his/her own original work, and all resources have been properly cited. A standard text of personal declaration is usually provided by the Faculty or University.

Abstract

Abstract (300 to 600 words) should in a succint and concise way inform the reader about the scientific objectives, principal results and their general implications. In addition, by reading abstract the reader should be able to judge where the work (thesis, publication) contains any specific information that he is searching for. The abstract is neither a commentary on methods to be used nor a short introduction to the topic or overview of the structure of the work. In the abstract, the writer must clearly separate objective results (field measurements, analytical data and other reproducible observations) from interpretations and hypotheses that reflect writer's opinion and the state of knowledge. Generally, we do not introduce and use abbreviations in the abstract and restrict the use of special symbols and characters (indices, Greek letters etc.). The abstract is often typeset as a single paragraph; the flow of sentences should be continuous.

Acknowledgements

Acknowledgements are placed prior to the table of contents, or near the end of the thesis (between the conclusions and reference list, or following the reference list). The acknowledgements section contains the following information: (1) institute (unit) where the work has been carried out, (2) initiatior of the topic, supervisor and co-supervisor(s) if applicable, (3) funding sources for field work, laboratory preparation, analytical work and instrument time. These sources may involve operating budget of the institute, projects of the supervisor or student, interna lor external funds etc., (4) appreciation of scholarly guidance by individuals providing help or contributing specific ideas, (5) acknowledgements to thesis reviewers if known, and (6) acknowledgements to relative persons, friends etc.

Table of contents

Table of contents (or Contents) list all chapter and section titles that are placed as headings on a separate line. In-line headings (e.g., in bold face) are not frequently used in the scientific literature, particularly in the journal papers. Chapters and sections are numbered starting from 1, following the Table of Contents. By contrast, sections such as Preface, Acknowledgements etc. that precede the Table of Contents do not have chapter numbering and are not listed in the Table of Contents.

Introduction

Purpose of the introduction is threefold: (*i*) to introduce the topic to the reader in a thought-provoking and attractive manner and convince him/her about its relevance and significance, (ii) to provide a continuous critical review of previous and existing knowledge, current importance, and to formulate objectives for new research (of the writer), (*iii*) to describe how the problem will be attacked and solved, logics behind individual steps, and structure of the thesis which follows.

In monographs, theses and project reports (in contrast to scientific papers), it is appropriate to present a review of previous knowledge in the field of study or geological area. Such a text should not have a form of incoherent paragraphs, which are reminiscent of excerpts from successive and perhaps unrelated papers. By contrast, the entire review should present a consistent and continuous style of the writer, who has acquired a balanced view of the problem and intends to present it to the reader in an organized way from the initial state to the depth and present state of knowledge. The text should be styled as to emphasize knowledge, which will be essential for the thesis, as well as critically pointing out incorrect or outdated previous results.

Geological setting

This chapter describes geological setting of the area under consideration. The writer should describe information about overal geological structure, relationships of individual geological units, their age, lithology, and possible origin. Detailed attention should be paid to geological units (complexes) or areas, where samples were collected and analyzed, so that it is possible to assign analytical results and data back to the field occurrence.

Methods

Analytical or experimental methods contain a technical description of preparation, analytical and processing procedures including intrument details, settings, standards and calibrations used, detection limits, accuracy and precision. Where uncertainties are stated (for instance, geochronological data, analytical concentrations), the writer must state whether he/she reports 1, 2 or 3 standard deviations (sigma).

Results

This section contains results and describes observations, which form the basis of the thesis. These include all field observations and measurements, photos, analytical and laboratory data, results of calculations and numerical models. It is not advisable to describe individual results and immediately proceed to their discussion (compare hypotheses).

The chapters Geological setting, Methods and Results must be written with intention that the reader must be able to accurately reproduce all steps of the research independently and arrive to the same observations and results. This particularly applies to unambiguous sample locations, identification of measurements, preparation and analysis of samples, analytical conditions, data processing, recalculation procedures, software used (version, setting, databases).

Interpretation and Discussion

In this section, the writer discusses the importance, implications and relevance of his/her results and observations. This comprises relationships between new results and previous studies, mutual differences, their causes. This part necessarily reflects the scientific intention and knowledge breadth of the writer, his or her ability to creatively combine ideas from previous studies and various other sources. The interpretation and discussion can be presented as a single section, proceeding from individual details toward generalization, or as two sections: (*i*) interpretation of the current data, particularly by evaluating trends in various projections, devising and presenting various numerical models etc., and (*ii*) discussion, which compares the current data and their implications with previous studies or results from broader region, other areas etc. Every scientific work should place the new results and their interpretation into a broader context, so that they can be used in other regions, interdisciplinary studies etc. For instance, the geothermobarometry estimates should form basis for reconstructing geodynamic processes. In Implications, the new results and data are discussed in broad, often genetic relationships and implications for other disciplines should be clearly explained. For instance, a crystallographic study of olivine has implications for seismology or for mechanical behavior of subducting slab in the Earth's interior.

The sections Interpretation and Discussion should provide inspiration and point of departure for future studies.

Conclusions (summary)

Scientific papers frequently do not contain separate summary but their text loosely closely by generalizing the implications of the study. For longer monographs, summary remains essentials. The conclusion section, usually 1-3 pages long, should not be an extended version of the abstract. Instead, it presents the results in broader context (that may not been obvious from the level of detail of the main text) and more space can be devoted to general inferences. Summary can be divived into paragraphs, sometimes these are numbered.

List of references

The list of references contains all resources – publications, manuscripts, reports, maps and other print products as well as Internet resources that were used during the preparation and writing of the thesis. Each resource must be quoted in the text, figures, tables or appendices at least once.

Appendices

Appendices are a repository of extensive analytical or graphical data, maps, original or interim (unprocessed) results that are not essential for reading and understanding the thesis.

FORMATTING AND WRITING STYLE

The formal structure and appearance of the thesis follows the style of scientific monographs and publications in the field of its topic. It is instructive to browse through several geological monographs and review papers, and follow the structure of the text, tables, figures, organization and structure of references, and appendices.

The thesis must have correct grammar and consistent spelling. English texts must be consistently written in either British or American English (spelling). Requirements for scientific writing style including use of abbreviations, symbols, capitalization and punctuation are internationally and nationally prescribed. Student may wish to consult: (i) general writing guides (e.g. Chicago Manual of Style, Oxford Style Guide), (ii) guidelines of the scientific publishers, societies and surveys (e.g. U.S. Board on Geographic Names, Kansas Geological Survey Style Manual and Word Usage Guide, ACS Style Guide), (iii) guidelines of the International Stratigraphic Commission, particularly relevant for the use and spelling of geological names (e.g. International Stratigraphic Guide, Stratigraphy Terminology and Practice) and (iv) instructions for authors available for each scientific journal (see journal websites). For practical examples of style and formatting, which somewhat differs among major scientific publishers (e.g. Elsevier, Springer, Wiley), it is always helpful to peruse some current scientific monograph (book) or individual papers from a single journal.

Page format and pagination

The thesis should be formatted for the DIN A4 page format with appropriate page margins (2.0-2.5 cm). Somewhat wider, asymmetric page margin is advantageous when the thesis should be bound. Page numbering always starts on the first page of the section labelled 1. (usually Introduction) and employs Arabic numerals (e.g., 1, 2, 3, 4, ...). Title page of thesis has no page number. Preliminary statements (e.g. Preface, Abstract, Acknowledgements, Table of Contents) are not page-numbered or use Roman page numbering (e.g., i, ii, iii, …) that runs through the final page of the Table of Contents.

Paragraphs and text fonts

First line indentation is slowly disappearing from scientific literature. Conventionally, the first line of each paragraph (excluding the first paragraph, which immediately follows the section heading) is indented by a small space (typically 1 cm for a single-column text, 0.5 cm for a two-column text). Metric distances are preferred over imperial units (1/2 inch = 1.27 cm or ¼ inch = 0.59 cm). More recently, intends are being abolished and paragraphs are spaced instead (e.g., half height, e.g. 6 pt).

The thesis may use distinct text fonts and/or font size for the following objects: normal (body) text, figure captions, table headings, table body and table footnotes. Any foreign-language expressions are printed in an italic font (for instance, Latin words: *in situ, sensu stricto, a priori, vs., etc.*).

Writing style

The scientific text should avoid indirect descriptions or narrative (incorrect examples: Intrusive units of the Erzgebirge batholith were described by Breiter et al. (1999) or These authors proposed a different method for normative calculation … or We will now illustrate the results in Fig. 7). The sentences must be informative and contain definite statements (correct example: The Erzgebirge batholith consists of biotite, muscovite-biotite and topaz granites (Breiter et al. 1999) or An alternative norm calculation by Barth (1962) prefers edenite over actinolite … or Measured silica concentrations are inversely correlated with temperature (Fig. 7)).

In contrast to many other languages, English uses more active voice in scientific writing. Actions performed by authors and specific persons should be written in an active voice (e.g. We use this abbreviation to indicate the reference calibration of experiments rather than This abbreviation will be used …). The passive voice should be associated with the action of instruments (e.g. Concentrations obtained by the ICP-MS differ from those …).

Plural *vs*. singular forms for rock units in the text, figure captions and map legends should be used sensibly and consistently. The rock names are typically used in plural form (referring to rocks forming a geological unit rather than to a single sample that we may use). The exception is a formal stratigraphic unit or other geological body (e.g. Blue Mountain Dolomite, Muschelkalk).

The technical English remains less strict with the use of present and past tense, nonetheless the writer should strive for principal corectness and clarity. Processes that occurred in the past should be described with past tense (examples: rocks were metamorphosed under amphibolite-facies condiions or Plinian eruption terminated this igneous event).

Referencing

Ideas that were expressed by other writers must be carefully referenced. Example: the age of metamorphism in the Bohemian Neoproterozoic is Cadomian (Kettner 1917; Dudek and Fediuk 1955) or Variscan (Urban and Dallmeyer 1998), or Chab (1986) proposed a nappe model in order to explain the inverted metamorphism in the northwestern part of the Bohemian Massif. References to studies of three or more co-authors are abbreviated with et al. (example: Steiner et al. 2007). This abbreviation implies plural form for associated verbs. Example: Steiner et al. (2001) advocate a non-subduction origin of jadeite-rich rocks.

Each figure and table must be referred to in the text at least once. Avoid sentences like: We illustrate the new results in Fig. 7, but use informative statements: crystal structure of zeolite includes large cavities (Fig. 1). The first references (callouts to figures and tables) in the text must be consecutive, thus general flow of the text determines the order of figures and tables. You may, however, refer to previous figures and tables recursively later wherever necessary.

Spelling (names, abbreviations, punctuation, capitalization, hyphenation)

Spelling and capitalization of *geographic* names is prescribed by English or national dictionaries (Deutsche Rechtschreibung). The geological names in the English texts are capitalized, as defined in the International Stratigraphic Guide. These recommendations require capitalization of the adjective and noun (e.g. Devil Formation, Southern Mountain Complex, Narrow Saddle Gneiss), but the spelling becomes counterintuitive with nouns that are used in general sense (cf. Long Valley Caldera, Moldanubian Granite Batholith). Here we recommend the full capitalization for fixed composite geological names only, but nouns or non-regional adjectives that are frequently used in the text in other or more general meaning should not be capitalized (e.g. Long Valley caldera, Moldanubian granite batholith). The geographic directions occuring in the regional names are capitalized if the composite adjective is formally defined (e.g. Western Erzgebirge pluton, but the Central Bohemian batholith has northeastern and southwestern segment). Numerous examples of correct national spelling are found in regional geological monographs (e.g. Geologie Deutschlands, Erläuterungen zu den geologischen Karten).

Abbreviations for geographic coordinates and directions in English are always capitalized, irrespective of their form (noun, adjective, adverb). Examples: quarry 1 km SE of Perth or the amphibolite occurrence extends 120 m further to the NW. In many other languages, the capitalization applies to nouns only, whereas adjectives and adverbs are not capitalized and abbreviated with a period (example: 340 m s. von der Seehütte or 500 m weiter nach W). The

importance of these descriptions has recently diminished because they are replaced by geographic coordinates.

English spelling differentiates among three hyphens: - (dash), – (en dash), — (em dash). The very long hyphen (em dash) is rarely used today. However, autocorrection mode of the word processors leads to frequent inconsistencies in use of short and long dash symbols. The short dash (-) connects expressions that acquire a single, composite status (examples: blue-gray color or amphibole-biotite granodiorite). The long dash (–) connects expressions related by between or from/to. This mainly applied to data ranges or page ranges (examples: the granites contain 70.4–72.9 wt. % SiO_2 or Journal of Petrology 42, 183–197). The very long dash (—) used to replace comma for subordinate clauses, with emphasis on break for reader. It can be preceded and succeeded by a blank space (example: all syenites — porphyritic and equigranular — have narrow range of modal composition). The very long dash is rarely used today and, if required, it is replaced by a pair of long dashes or commas.

Quantities, values and units

Numerals in German language are separated with a comma, in English language with a decimal point, consistently in the text, tables and figures. Use of decimal point in the German texts is acceptable but must be consistent throughout the entire manuscript. Value and unit are separated by a single blank space (examples: 5 km or 460 °C or 14 kJ mol^{-1}). The only exception are angular quantities (degrees, minutes and seconds), whereby the value and the unit are written together without separaration (examples: 50° 14’ 51“, 127/36°).

Abbreviations for weight (mass) and mole percent are not used uniformly. Common options are wt. % or wt%, mol. % or mol%). Note that in English „mole“ is a full noun (used as part of a sentence), whereas „mol“ is an abbreviation (examples: mole fraction of grossular is 0.26; molar volume V = 2.41 cm^3 mol^{-1}).

Symbols of physical and chemical quantities (variables and constants) and numerical indices are written in italic font, consistently in the text, tables, figures and equations. The symbols for pressure and temperature, when used as physical quantities or variables, are likewise spelled in italic font (example: gneiss was metamorphosed at T = 620 °C and P = 8.3 kbar). When such a symbol has been used in a word abbreviation, then a standard font is used (example: high-pressure (HP) rocks).

Equations

Formulas, equations and chemical reactions are written as a separate line. They start from the left margin or are centered. The equation may end with a period or a comma, in this case the following text must start accordingly (with an upper- or lower-case letter). Most of the scientific journals and publishers prefer equation numbering, with consecutive equation numbers placed in round parentheses at the right margin. Example:

The rate of crystal settling in a magma (v) was calculated from the Stokes‘ law

$$v = \frac{2}{9}, \qquad (1)$$

where r represent the crystal radius and g is the gravity acceleration. ...

Tables

Each table has a short title without a period at the end. Variables, abbreviations or symbols may be explained below the table, in the form of footnote. Tables do not have vertical broders, and horizontal borders are used to separate the first row (column headings) from the main body, or to separate several table sections. The borders are usually 0.5-0.75 pt thick, the top and bottom borders may be a double thickness (1.0 or 1.5 pt). Tables are numbered consecutively throughout the manuscript (e.g., Tab. 1, 2, 3, ..., Table 1, 2, 3, 4, …) or separately in each chapter (e.g. Tab. 2.1, 2.2, ..., Table 7.1., 7.2).but the style must be consistent with that used for figures and equations.

Figures

Figures may contain photographs, instrumental images, maps, and line drawings. Figure caption (explanatory description) is stated below the figure. All figures are consecutively numbered in the entire thesis (example: Fig. 1, 2, 3) or in each chapter (example: Fig. 3.1., 3.2.). Numbering style must be uniform for figures, tables and equations. Individual parts of a figure plate are labeled (a), (b), (c) in parentheses, and consistently refer to in the text (examples: Fig. 5b, 7c). The order of internal labeling (down then right, or right then down) must be uniform for all plates in the thesis.

Field and instrumental photographs and photomicrographs must have appropritate brightness and contrast. Additional drawings in photographs, which shall emphasize important features, must be made should have sensible constrast and dotted or dashed line style as not to cover the original image. Photographs of outcrops must have a scale of appropriate size, for instance geological hammer, pocket knife, lens cover, coin. The length or diameter of the object is stated in the figure caption. Photographs of the hand specimens or thin-section micrographs must include a scale bar (for instance, white or black bar) and its length. In some cases, width of the view may be stated in the figure caption.

Diagrams and line drawings are designed for printing in single-column (7.5-8.5 cm) or full-page width (17-18 cm). Graphics must have clear and legible labels with appropriate font size. In the printout, no letters, numerals or symbols should be smaller than 1.5 mm. The line thickness is usually between 0.25 and 0.60 mm, the minimum line thickness is 0.15 mm; do not use hair lines. Letters and other objects, which overlay heterogeneous backgrounds (e.g., dotted patterns, texture fills), shoud be underlain by a homogeneous, single-color fill or by a letter with thick outline (e.g., 0.5 mm) of the background.

List of references

The list of references contains bibliographic data of all resources used in the present work and individual bibliographic entries are designed to contain all the information relevant to uniquely locate the resource (in a library, publisher website etc.). Structure of references differs for (i) papers in a journal, (2) chapter in a monograph and (3) scientific monograph (book), volume or thesis. Formatting of references (use of periods, commas, colons, conjuctions and abbreviations, capitalization and use of bold or italic fonts) differs in every scientific discipline and in most journals. It is advisable to choose one publisher (scientific journal) and consistently follow its reference style. Examples:

Plank T., Langmuir C. H. (1998). The chemical composition of subducting sediment and its consequences for the crust and mantle. Chemical Geology 145, 325-394.

Bowen N. L. (1928). The Evolution of Igneous Rocks. Princeton University Press, Princeton, 126 p.

Use of journal abbreviations is not preferred because of the lack of international consistency. Abbreviation „p“ is used for a single datum (usually the number of pages in a monograph) and „pp“ for a page range (usually with the starting and final page of a volume chapter).

Philpotts A. (1990). Igneous and Metamorphic Petrology. Science Publishers, Green City, 498 p.
Almenger H. (1997). Geological structure of the Odenwald-Scharzwald zone. In: Weisbrod T. (ed.) Variscan Orogeny in Europe, pp. 73-86.

The list of references is ordered alphabetically by the last name of the first author. Entries by the same first author are arranged as follows: first – single author studies, ordered chronologically by publication year; second – two-author studies, ordered alphabetically by the last name of the second author, then chronologically; third – studies with three or more co-authors, ordered by the publication year, then subdivided by a, b, c etc. attached to a publication year in the order of their appearance in the text.

Faithful J. (1976): Mineral mode of colorless rocks. European Journal of Enquiry, 137, 14-27.
Stoner A. (1968): Color of rocks and its relationship to mineral mode. Bulletin of American Science, 24, 17-39.
Stoner A. (1970): Hardness of rocks and its practical utility.
Stoner A. (1973): New studies of rock coloration. Bulletin of American Science, 29, 8-14.
Stoner A., Devoted J. (1967): Catalogue of rock colors. Part I. Igneous rocks.
Stoner A., Faithful M. (1964): A method for determination of rock color.
Stoner A., Strong F., Faithful J., Stoner B. (1965): Correlation between rock color and hardness.
Stoner A., Faithful J., Careful P., (1971a): Catalogue of rock colors. Part II. Metamorphic rocks.
Stoner A., Careful P., Faithful J., Stoner B. (1971b): New measurements from rare rocks.
Stoner A., Devoted J., Careless M., Careful P. (1975): General catalogue of all rocks. Polygrafia, Berlin, 274 p.
Strong F. (1973): Hardness of black rocks. Academic Publisher, New York, 487 p.
Strong C. (1974): Comment on hardness of rocks. Scientific Reports, 14, 27-36.