

Preparing an MSc-Thesis within the REM-Programme

Recommendations by

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based on materials from

- Schanz, H. & Ifenthaler, D. (2008)
- Henninger, S. & Schossig, P. (2009)

| | |
|---|-----------|
| 1. PREFACE | 2 |
| 2. INTRODUCTION | 2 |
| 2.1. MSc-THESIS: THE CROWN OF HIGHER ACADEMIC EDUCATION..... | 2 |
| 2.2. WHAT IS A "SCIENTIFIC" MASTERPIECE?..... | 2 |
| 2.3. BASIC REQUIREMENTS AND NECESSARY SKILLS..... | 6 |
| 3. STEPS IN THE MSc-THESIS PREPARATION | 7 |
| 3.1. SELECTING A TOPIC AND SUPERVISOR..... | 7 |
| 3.2. REGISTRATION OF THESIS PROJECT WITH THE EXAMINATION OFFICE..... | 8 |
| 3.3. PREPARING A RESEARCH PROPOSAL..... | 9 |
| 3.4. 'GO' OR 'NO-GO' DECISION..... | 13 |
| 3.5. CARRYING OUT THE RESEARCH..... | 13 |
| 3.6. WRITING THE THESIS REPORT..... | 14 |
| 3.7. COLLOQUIUM REQUIREMENTS..... | 15 |
| 3.8. SUBMITTING THE THESIS TO THE EXAMINATION OFFICE ("PRÜFUNGSAMT")..... | 15 |
| 4. ADMINISTRATIVE ISSUES AND GRADING | 16 |
| 4.1. COSTS ASSOCIATED WITH CARRYING OUT THE MSc-RESEARCH..... | 16 |
| 4.2. QUALIFYING FOR AN EXTENSION: FALLING ILL AND OTHER EXCEPTIONAL SITUATIONS..... | 16 |
| 4.3. DISSEMINATION OF FINAL THESIS REPORT..... | 17 |
| 4.4. THESIS EVALUATION..... | 17 |
| 4.5. PLAGIARISM..... | 17 |
| 4.6. GRADING..... | 18 |
| 5. LITERATURE | 19 |
| 5.1. FINDING LITERATURE FOR THE THESIS RESEARCH..... | 19 |
| 5.2. FURTHER READINGS: INTRODUCTION INTO SOCIAL SCIENCE..... | 19 |
| 5.3. FURTHER READINGS: METHODOLOGY AND STATISTICS IN SOCIAL SCIENCES..... | 19 |
| 5.4. FURTHER READINGS: ENGINEERING RESEARCH..... | 20 |
| 5.5. ADDITIONAL INTERNET RESOURCES..... | 20 |
| REFERENCES | 21 |
| ANNEX A: CHECKLIST OF ACTIONS AND RESPONSIBILITIES | 23 |
| ANNEX B1: OPTIONAL STRUCTURE OF THESIS EVALUATION SHEET (SUBJECT TO INDIVIDUAL PREFERENCES OF SUPERVISORS) | 24 |
| ANNEX B2: EVALUATION SHEET OF FRAUNHOFER – ISE | 25 |
| ANNEX C: TITLE PAGE | 26 |
| ANNEX D: DECLARATION OF OWN WORK | 27 |

1. Preface

This document provides guidelines and recommendations with regard to the preparation of a MSc thesis for students within the REM-Programme. **These guidelines are neither official nor binding, and in no way do they replace the many excellent textbooks providing an introduction into scientific writing and research proposals.** Rather they should provide students with a first direction when starting their MSc-thesis project. Note: **individual requirements and standards for MSc-thesis projects will be fixed by project supervisors within the framework provided by the official examination regulations.**

The guidelines presented below reflect typical MSc-thesis procedures for thesis projects within the Faculty of Forest and Environmental Sciences (see study handbook). However, under certain conditions it may be necessary to come to specific arrangements deviating from these procedures (e.g., carrying out research in the tropics, participating in larger projects). In these cases, please contact your supervisor and your study coordinator early enough for the necessary arrangements.

This document builds on MSc-thesis recommendations developed for students from the MEG-Programme (see Schanz & Ifenthaler, 2008). In order to adapt this guide to the REM-Programme, additional criteria were incorporated that draws upon the engineering sciences. The content of this adapted MSc-thesis guide will be presented to REM students during the module Research Skills in details.

2. Introduction

2.1. MSc-thesis: the crown of higher academic education

Many people see the writing of an MSc-thesis as the coronation of higher academic education. Indeed, the importance of thesis work is reflected by the prominent role it takes within the whole MSc-Programme. After completing compulsory and elective modules in the educational programme, the MSc-thesis offers the challenge to set up and to carry out a scientific research project with a high degree of autonomy and responsibility. This challenge includes:

- assuring adequate delineation and definition of the research topic,
- building a sound theoretical framework for orientation of the research,
- collecting data in a systematic and verifiable manner,
- analyzing data critically,
- presenting results comprehensibly,
- drawing sound conclusions based on a comprehensive discussion of the results,
- showing the potential contribution of one's research to the theoretical reconstruction of a topic, and
- proposing areas for further research based on the findings and limitations of the study.

2.2. What is a “scientific” masterpiece?

Most MSc-candidates already have some experience carrying out research (e.g., conducting experiments during practical periods). However, while working on their MSc-thesis, students are often confronted for the first time with the requirements of a “scientific work”. What this term means exactly is often not clear at the start.

What is science?

The question “what is science” has been answered in many different ways and has evolved over time. Broadly, science is about acquiring knowledge to explain the observed world and predict what can be observed in the future. Science is also accompanied by a process of research through which knowledge is obtained. This process consists of a systematic investigation to establish a better understanding of an issue at hand.

Classically, science can be divided into two categories: formal and factual science (Bunge, 1998: 24). Formal science includes mathematics and logics. It is self-sufficient in terms of proof method, that is when the formula is validated by reasoning alone rather than experiences (e.g. observation) (Bunge, 1998: 25). On the other hand, factual science contains two commonly known groups of science: (1) natural science, which explains and predicts natural phenomena, and (2) social science, which explains and predicts human behaviour as an integrated part of society. Both types belong to empirical sciences, which entails knowledge about phenomena that is gathered through observation, experimentation or experience, and can be validated by peers through replication.

Increasingly, science has been undertaken for the purpose of solving a problem or developing a technology. This kind of science is often called “applied science”, resulting in practical application. Engineering science belongs to this category. By applying natural science in “designing the human-made world” (Katehi et al., 2009: 27), engineering science shares knowledge, methods, and ways of thinking, and standards with natural science (Auyang, 2006: 3). The electrical engineer Vannevar Bush described the relationship between natural science and engineering as “partnership”: “... engineering is concerned with the conversion of [natural] science into technology” and “[natural] science ... translates technology into new [natural] science and mathematics” (Auyang, 2006:3). Given such a partnership, engineering and natural science are often treated together.

Due to the complexity of inter-linkages between natural world and human society, the notion of “interdisciplinary research” based on holistic and systems thinking has emerged in response to fragmented nature of conventional discipline-based approaches of science (Checkland 1981, 59–92 in Woodhill, 1999). The term ‘interdisciplinary’ is interpreted in various ways. In a broad sense, interdisciplinary research “involves interaction among two or more different disciplines” (OECD, 1998 in Guidelines, 2009). Tress et al. (2004: 3) specifies that “interdisciplinary” entails “different unrelated”¹ academic disciplines in a way that “forces them to cross subject boundaries to create new knowledge and theory”. For example, knowledge in disciplines such as natural resource management that spans across natural and social sciences is generated through interdisciplinary research. By converting knowledge of different natural science disciplines into solutions to meet human society’s needs, engineering research often possesses the interdisciplinary nature too.

Given its complexity and multi-faceted nature, science has its own academic discipline, namely the epistemology/philosophy of science (or, if you want the “science about science”). This guideline cannot provide an overview on different epistemological approaches. Many excellent introductory textbooks on the epistemology of science are available to give the student an orientation on this question. Instead, this guideline highlights the two commonly cited epistemological perspectives – “positivism” and “constructivism”.

Positivism, a paradigm underpinning “classical science”, assumes that knowledge and truth can be discovered in a value-free and objective way, independent of human experiences (Miller 1985: 170 in Woodhill, 1999). Under this paradigm, scientific methods are assumed to have the ability of objective observations of a phenomenon (Woodhill, 1999; Crotty, 1998). Systems’ behaviour is also expected to be controllable and predictable (Dash, 2005). In contrary, constructivism assumes that meaning

¹ “Unrelated” here means those disciplines ‘with contrasting research paradigms’, for instance, policy science and water science (Tress et al, 2004).

(knowledge and truth) is not discovered objectively, but is constructed by humans who experience “the world they are interpreting” (Crotty, 1998). Following this epistemological perspective, meaning is unavoidably “socially constructed” through interactions and communication between human subjects (Berger and Luckman 1991 in Woodhill 1999). Accordingly, science is perceived to be as “coherent explanations about phenomena as they are experienced by humans rather than the development of objective knowledge about an external reality” (Maturana and Varela 1987: 28-29 in Woodhill, 1999). Such a perspective also recognizes “different but equally valid - though not necessarily equally desirable “realities”” held by different groups of people (Maturana and Varela, 1987: 241-245 in Woodhill, 1999).

This guideline does not favour one perspective over the other. It is crucial for the students to be clear about their own epistemological assumptions, because this determines to a large extent the logic and sequence of the research process.

Basics of MSc-Thesis

As a “scientific” masterpiece, a MSc-thesis encounters different expectations compared with a Ph.D. thesis. In writing a PhD-thesis, a substantial and original contribution to scholarship is central, for example, through theoretical reconstruction of the phenomena, or eventual development of methods. In contrast, an MSc-thesis is characterized by the adequate application of existing methods and theories to a real world phenomenon. However, the work of an MSc-thesis should have at least a sound research approach following some basic scientific standards:

- The thesis must be theory-based. Theories can help us to explain observations in real world and to make predictions regarding the development of phenomena in new situations. Mostly, the student’s starting point for enlightening real world phenomena has to be existing theoretical and empirical literature², against which student’s findings have to be further discussed and reflected.
- The thesis must be verifiable. This is only possible if a clear line of argumentation is given through the existing theoretical and/or empirical literatures, and the underlying assumptions are made explicit. Ideally, the original data should be included in the work (usually as an appendix) to allow the reader to verify the drawn conclusions and judge upon the quality of findings. The original data can include, for example, measurements and procedures by documentation in the lab, the transcript of interviews, or the protocol of workshops, etc. As stated in the epistemological perspectives, it is a matter of course that science is always at least partially subjective, because science in itself is a social activity carried out by social beings. However, this fact should never lead to the rejection of the call for scientific objectivity. Scientific objectivity thereby does not result out of a fictive unconditional assumption, but out of the clear exemplification and reflection of the conditions and assumptions underlying the research process.
- The thesis must be in principle replicable. It should be possible to repeat the empirical part, thereby leading to similar results and conclusions. This is only possible if the methods for data collection and for data analysis are described in a comprehensive and transparent manner, while the work process is as unbiased and reflective as possible.

In addition, in MSc. and Ph.D theses as well as in all following steps in a scientific career, a research process consists of following steps as shown in Figure 1. Each of the steps is briefly presented below.

² This is not applicable to the fundamentally inductive approaches. They start with observations and use inductive reasoning to build up a theory (De Vaus,2001). Grounded theory is a good example here.

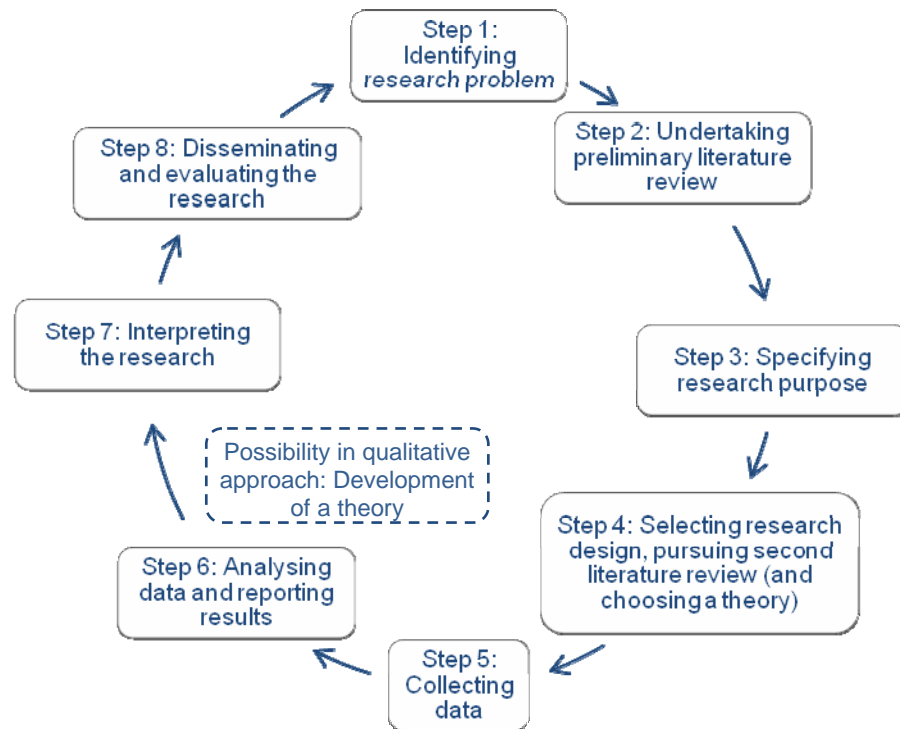


Figure 1: Steps in the research process cycle

Source: Adapted from Plano Clark & Creswell (2010 forthcoming)

The starting point of research is the identification of a research problem, which consists of specifying an issue at focus, justifying the research, identifying the target audience and suggesting the potential importance of the research. The second important step in the research is a “preliminary literature review”, where the researcher locates and selects sources of the topic (e.g. journal articles and books in academic libraries) and thereby identifies the research area that either has not yet been addressed properly or is missing in the existing literature. The third research step is “specifying research purpose”, where the researcher identifies the major intents or objectives of the study and further narrows them into specific research questions (or hypotheses).

To achieve the research objectives, the researcher engages in the step of “selecting a design and pursuing second literature review” (step 4). In this step, the researcher selects a research design to provide an overall plan for the study, identifies literature relevant to the topic and research questions, and chooses relevant theories or a theoretical framework for the study. In the next step (step 5), the researcher collects data via different research methods, such as interviews, experiments, questionnaire, participatory observation, etc. During and immediately after this step, the researcher interprets and analyzes collected data and represents the findings in visualized form, e.g. tables, figures, maps, diagrams, etc. (step 6).

The researcher then engages in “interpreting the research” (step 7). This step involves making connections between research questions, theory and findings, explaining how research questions have been answered through the study, stating the ground for the findings, drawing conclusions about the results of the study, stating the limitations of the study, and proposing future research. Finally, the researcher develops a written report and distributes it among target audience. The report will then be evaluated by the audience with its own assessment standards for judging upon its quality (step 8).

The research process cycle, presented in Figure 1: Steps in the research process cycle, may alternatively start with the step of data collection through the variety of research methods (e.g. interviews, participatory observations, etc.), based on a roughly specified research question. This is called grounded theory (Glaser & Strauss,

1967; Bryant & Charmaz, 2007; Mey & Mruck, 2007), which follows fundamentally inductive approach. Right after the collection of the first data, it is further analyzed using sequence analysis to search for the patterns behind the text by developing a series of codes extracted from the text. Further, these codes are structured into the concepts and categories, which subsequently help to develop a base for a theory or an engineering hypothesis.

Engineering research distinguishes itself in details at specific steps (step 2 to 6) of the general research process (Figure 1). After identifying specific engineering problems (step 1), the researcher specifies her/his research purpose(s) (termed as “specification” in the engineering design (ITEA, 2000 in Katehi et al., 2009) (step 3). Next, the researcher conducts preliminary literature review of what have previously been done (step 2). At the step 4, the researcher selects a research design, depending on the method he or she will use for data collection (experiment, simulation model, or combination of both). The next step of “data collection” (step 5) generally starts with a plan of a structured test rig or simulation for data collection and then enters an iterative process of building up primary experimental set-up (e.g. prototype) or simulation model, measuring, and modifying the primary experimental set-up or simulation model. At the step 6, the researcher applies the final prototype or simulation models to achieve the research objectives (e.g. using developed simulation model for calculating optimised engineering solutions), reports the results and makes documentation of the data collection process..

2.3. Basic requirements and necessary skills

The master thesis must be completed within a period of six (6) months and is worth 30 ECTS credits. The earliest point at which a student may register for the MSc-thesis is during the 3rd semester, after **at least 70 ECTS credits** have been collected. The latest possibly point to begin with the master thesis is **no later than three months** after the last module’s exam. **Note:** if the application for a master thesis is made late or not at all, the student will automatically receive a grade of 5.0 (unsatisfactory) for the thesis and fail it.

The MSc-thesis is an examination in which the candidate demonstrates her/his capability for independent research using scientific methods and adequately presenting the results within a limited time period. Although not common, group thesis might be accepted if they are explicitly permitted by the subject-specific appendix B of the Exam regulation of the Master of Science Programme § 20 (1), (2) and (3). In this case, the individual contribution of each student has to be clearly identifiable, assessable and gradable. As a rule, the MSc-thesis must be written in English. The subject examination committee decides in individual cases whether exceptions to this rule are permissible.

For the successful completion of an MSc-thesis certain knowledge levels as well as mastering of certain skills are basic requirements. It is highly recommended to follow a course on methodological aspects of research before starting the MSc-thesis. The module *Research Skills* provides an in-depth introduction to different research approaches. In discussing the research process cycle and generating first ideas for the thesis project, the *Research Skills* module denotes the starting point of the MSc-thesis. Accordingly, sound knowledge of methods will be assumed as a basis at the beginning of the thesis work and will not be touched upon during the supervision. Furthermore, sound skills in applying modern text-, databases-, spreadsheets-, drawing, modeling and reference management software are expected from the beginning. Those software skills can also be learnt and improved during the thesis work process. Some useful software and applications include:

- [MAXQDA](#) for the analysis of qualitative data
- [AQUAD](#) for the analysis of qualitative data
- [NVivo](#) for deep level analysis of text based data and/or multimedia information
- [CDC EZ-Text](#) for the analysis of semi-structured qualitative databases

- [SPSS](#) for statistical analysis
- [R for Statistical Computing](#) for statistical computing and graphics
- [WinGen](#) for generating IRT parameters and item responses
- [LISREL](#) for structural equation modelling
- [HLM](#) for analysis of hierarchical data
- [Mathematica](#) for computation, modelling and simulation
- [Wavemetrics](#) for graphing, data analysis, image processing and programming
- [ZOTERO](#) for reference management
- [JabRef](#) for reference management
- [Citavi](#) for reference management
- [MENDELEY](#) for reference management and file sharing
- [TEXnicCenter](#) for developing LaTeX documents

It is in the student's own responsibility to acquire the necessary knowledge and skills in time before starting with an MSc-thesis. In case these skills have to be acquired during the thesis work, extra time should be planned. It is recommended that the student delivers a summary of research and presentation skills obtained so far upon the first meeting with his or her supervisor to avoid disappointments on both sides in the course of the training period.

3. Steps in the MSc-thesis preparation

3.1. Selecting a topic and supervisor

The first step in working on a MSc-thesis for the student is to select a topic and supervisor. Some students prefer to work out a topic in co-operation with an (inter)national organization or company, while others write their MSc-thesis at University. Whatever the preference of the student, there exist two general strategies to find a topic:

- Topics offered by working teams or professors: In this case, topics are mainly related to ongoing or planned research projects within the University or external organization. Students interested in such topics should directly contact the leader of the relevant project or department.
- Topics proposed by the student: In this case, students formulate their MSc-thesis topics (preferably in short written format) and contact a potential supervisor. Students shall then discuss the feasibility and relevance of their topic with a supervisor. In case a student is uncertain which supervisor should be contacted regarding their suggested topic, she/he is required to discuss the topic with the REM-Programme Coordinator or the REM-Programme director.

Selecting a supervisor is one of the most important decisions a student makes in the MSc-thesis process--equally important as selecting the right topic. It is the student's responsibility to find both an appropriate supervisor and second examiner. **Note: both supervisor and second examiner must be qualified as either a full professor or PD (Privatdozent) at a recognized University. Additionally, at least one of them must be from the University of Freiburg.** Alternatively, research assistants, research employees, or lecturers can be approved as the first supervisor or second examiner if they act "under the professional responsibility and supervision" of any professor (professional responsibility and supervision of a professor will be explained upon application of the MSc-thesis by corresponding a counter-signature). The student should also name the "supporting scientific supervisors" on the cover of their MSc-thesis, including those who were directly involved in the supervision of the MSc-thesis work. **Note: "supporting scientific supervisors" are not considered as examiners** within the regulations for the M.Sc. Programme's examination; however, their comments may be incorporated into the report. Please notice, there shall be no official or personal relationship of dependence between your first and the second

supervisors (e.g. it is not allowed that a professor be your first supervisor and his assistant be your second examiner).

Especially when MSc-research is carried out abroad, adequate scientific supervision must be guaranteed in the respective country (in most cases by selecting the first supervisor or second examiner from a local university) or within the respective organization. In the case that a first supervisor/second examiner cannot be obtained from a local University the student and her/his first supervisor/second examiner must submit a letter to the dean of studies, Prof. Fink in order to justify the involvement of an external supervisor/second examiner. A good reason would be that nobody at the University of Freiburg has the expertise in the student's research topic or that the student has to carry out fieldwork outside Freiburg and wish to have one supervisor nearby. Nevertheless, it should be kept in mind that all arrangements for supervisors/second examiners must be settled by the student prior to the start of the thesis work.

A soccer player and her/his coach

A great deal of independence is expected from the student in preparing the MSc-thesis. The role of the supervisor is limited mainly to guide the learning process and not to provide specific knowledge. In this respect, the relation between the student and the supervisor can be compared to those of a soccer player and her/his coach: the player plays and scores, but the coach provides the player with hints and tactics. In contrast to soccer, the training progress itself is a central part of the MSc-thesis. The grading of the MSc-thesis is thus not a characterization of the student's qualities as a scientist, but rather a feedback on his or her scientific training progress and the quality of the thesis report.

Students should not expect supervisors to provide more than basic information for their thesis project. Finding relevant literature, working out a good problem statement, defining objectives and research questions, and elaborating a sound conceptual as well as methodological framework is already one of the core-issues of scientific work and has, therefore, to be carried out by the student independently. It is an important learning experience to find out that science is much more than just the "blood and sweat"-part of data collection and analysis! Nevertheless, the supervisor will be ready to assist the students in all phases, if requested.

The supervisor is the person that provides feedback at different stages throughout the process of preparing the MSc-thesis as well as controlling the process itself, including the contractual agreements. No general rules on the frequency and duration of supervision meetings exist – this depends on the individual agreement between the student and the supervisor. It is the student's responsibility to signal the need for meetings with the supervisor in advance and in a timely manner. Given the intensive training process, it is important that the expectations of both the student and supervisor are made clear from the beginning; this is key to achieving an unambiguous agreement for the duration of the MSc-thesis project. In order to avoid disappointments, these agreements are best laid down in written form in a so-called "thesis contract" at the very beginning of the training process (see Annex A: Checklist of actions and responsibilities).

3.2. Registration of thesis project with the examination office

Registration of the MSc-thesis

Once the student has chosen an acceptable topic and found an appropriate supervisor, he or she must apply at the examination office for approval and permission to begin writing the thesis (the [application form](#) can be downloaded from the examination office website). The form must be signed by both the student and her/his first supervisor. Prior to the submission of the form, the student and the first supervisor have to discuss upon the choice of the second examiner for the thesis and include her/his name in the application form. While the second examiner is judging upon the quality of final MSc-thesis along with the first supervisor, the former is not involved in the supervision process itself. The student and the first supervisor have to also agree

upon the starting date of the MSc-thesis and include it into the above mentioned form. Moreover, a provisional title of the master thesis must be written in the registration form. This title might be slightly changed, as long as it is obvious that the topic of thesis has not been changed. Therefore, keywords shall remain the same.

Timeframe of MSc-thesis work

Work on the thesis cannot begin prior to the chosen starting date, which is recorded in the form. The student submits the completed form to the examination office. From there it will be forwarded to the chair of the examination committee for approval. Once the chair has approved the application for MSc-thesis, the examination office will send the student a confirmation letter per mail (make sure you keep the university updated about your address) and **determine the individual submission deadline**. The student may start working on the thesis not earlier than the date determined by the examination office. You will have exactly six months to complete your thesis. Writing the masters thesis **can only be suspended once and only during the first five weeks after approval**. A new topic must be submitted within four weeks.

3.3. Preparing a research proposal

After registration, the next step in the thesis work is preparing a consistent and comprehensive research proposal. The thesis proposal is a product of preparatory research around the theme that will be developed. Students must become familiar with the historical context, the theoretical problems, and the empirical specificities of the theme in order to define, in precise terms, what and how the topic at focus will be studied. Given its importance, this step might very well require about 20 percent of the total thesis preparation time. An average thesis proposal is between **8 and 10 pages**, and the student shall incorporate several important components, which are described in detail in the following section.

Component 1: Problem statement

The problem statement will likely be the major component of the MSc-thesis proposal upon which the first evaluation of the topic and the overall research project will be done. The problem statement shall represent the motivation for the selection of the topic and a clear delineation of the problem field, finally resulting in a concise problem statement. In writing this part of the proposal, the student should clearly address the following questions:

- What is the gap or inconsistency in the relevant literature that needs to be further researched? Is there need for replication of a study in a different setting? Is there something theoretically unclear or in dispute that is worth studying? Is there a programme, project, or product that needs further evaluation?
- What problems does the student's research aim to address?
- How does the student's research add value to society and/or science?

If done in a sound way, the problem statement implicitly and explicitly reflects the social and/or scientific relevance of the selected research topic. In qualitative research, the problem statement calls for an *exploration* of perceptions and for an experience of participants; in quantitative studies, the problem statement mainly calls for an *explanation* and prediction of relationships among variables (Plano Clark & Creswell, 2010 forthcoming). To develop a clear problem statement, a preliminary investigation must be carried out that includes a review of the theoretical and empirical literature. The role of this preliminary investigation is to establish if sufficient knowledge/information exists to pose a concrete problem statement, and to ensure that the topic has not already been exhausted by other researchers. .

Component 2: Research objective(s) and research question(s)/hypotheses

This part answers specifically what the student is trying to accomplish by carrying out their study. The research objective is a statement that advances the overall direction or focus of the study, which is further clarified in research questions and/or

hypothesis. It is important that the objectives are (1) strictly related to the research topic (i.e., they do not change the focus by introducing extra elements to the topic), and (2) exhaust the topic completely (i.e., they do not leave out any component of the research topic).

Subsequently, the research objective(s) should be translated into research questions. This entails explicitly stating the questions that need to be answered in order to fulfil the research objective(s). Depending on the type of study, an alternative way of posing a research question is to state a hypothesis. A hypothesis is a proposition in which the student makes predictions about the relationship among attributes or characteristics. While mainly used in quantitative studies, (working) hypothesis can sometimes be formulated in qualitative research too.

Component 3: Preliminary theoretical frame/literature review on the topic

This section contains a critical review of the existing studies relevant to the research topic and covers existing theoretical and empirical literature. The literature review improves the student's understanding of the range of theories and methodologies researchers use for studying specific topics (Eves, n.d.).

When writing a proposal in natural and engineering sciences, the student shall present a broad conceptual/theoretical framework (e.g. theories in solid physics) or model (conceptual representations of a specific small system, e.g., model of solar cell) that forms the basis for the following research (Auyang, 2006: 158-159). For the social sciences, the student shall describe and develop a theoretical framework specific for her/his research question(s) and objective(s). The theoretical framework acts as a partial guide for the phenomena under study, thus giving direction to the overall thesis work. In other words it guides the student in his or her approach to the theoretical reconstruction of the topic. In developing a theoretical framework, the main theoretical concepts should be presented, along with their relations to the substantive areas under investigation.

The theoretical framework should be an argumentation of the student through existing theories and concepts, finally resulting in the student's own conceptual model (typically summarized in graphical form at the end of the theoretical framework section). Working out the theoretical framework is therefore a creative act. For instance, if researchers disagree over the definition of concepts or their application, the key insights from this debate should be laid out, showing the differences and similarities — and finally, how the student will incorporate these insights into her/his research. Also if the direct application of concepts and theories is not possible for the chosen research topic, the student should point out how she/he has adapted the concepts respectively.

In sum, developing a theoretical framework and clear conceptual model act as a “map” to identify concepts within the empirical complexity of the real world. Investing time and energy in preparing a good and analytically sharp theoretical framework is always worth the effort, and can help to save a lot of “blood and sweat” afterwards.

Component 4: Methodology/Research design

In this part, the student shall communicate unambiguously, concisely, and comprehensively how the research will be carried out to achieve the research objectives. Yin (1989 in De Vaus, 2001:9) claims that research design “deals with a logical problem”, that is, “the structure of an enquiry”. The function of this part within the research proposal (and later in the thesis report) is to specify reliability, validity and principle replicability of the study. Research design often involves four steps: (1) specifying the type/character of the thesis project, (2) data collection, (3) data analysis, and (4) the working plan for the study.

Step 1- Identifying character of the thesis work:

First, the student should be clear about the type of thesis work she/he will conduct, because it fundamentally determines in which way research is designed. In general, research can be categorized according to the study purposes, such as exploratory (Type 1), explanatory (Type 2), and predictive (Type 3) (De Vaus, 200: 1-4). Box 1

briefly presents these three types of research. When necessary, these three can also be extended to a comparative type of research. While it may seem obvious to the student which thesis type she/he intends to pursue (having already selected a topic and defined a problem statement), it is highly recommended that the student explicitly note the character (type) of their thesis work.

Step 2-Designing data collection:

In social science, four questions related to data collection are important:

- What is seen as data and what sources of information are the data derived from?;
- What are the criteria for determining the sources of information? (e.g., who will be interviewed? Why certain policy documents are considered for the analysis and not others? How many people will receive questionnaire(s)? Why this case study was selected and not another?);
- What methods are employed to collect data from sources of information (e.g., observations, interviews, content analysis); and
- Which instruments within the methods family will be used (e.g., questionnaires, semi-structured interview guideline, observation manual).

In natural and engineering sciences, the student specifies which data are to be collected and which methods are used for data collection. Depending on the methods used, the method design may include a brief explanation of the following:

- The experiment set-up including the types and amount of materials needed;
- The simulation model to be built and/or supportive software;
- Combination of 1) and 2)

In both social and natural science, the student shall justify why their selected research method(s) are the most appropriate for the fulfilment of their stated research objectives. Research method(s) must have a clear connection with each research step and in particularly with the research question(s) or hypotheses.

Step 3- Data analysis:

Furthermore, research design includes data analysis, where the student explains how results will be analyzed and interpreted. Information on specific methods and tools (e.g. software) used for the analysis should be provided in this section. Thus, the students should inform themselves in advance about the various methods and availability of research instruments for data analysis relevant for their study.

Box 1: Types of engineering science theses

Exploratory (Type 1): this type of thesis asks “what are the properties of system S”? Typically S is some system intended to solve an engineering problem, but whose properties are inadequately understood. The novelty in an exploratory thesis comes from the discovery and characterization of the interesting properties, and from the design and execution of the process by which they were observed. The evidence is partially in the form of the observed results and partially an argument justifying the appropriateness of the observational process.

Explanatory (Type 2): this type of thesis asks “what theory adequately explains observation O?” The novelty in a theoretical thesis is found in the theory itself. The evidence for its utility is normally its ability to explain the previously-unexplained observations and to make non-obvious predictions about other features of the world.

Predictive (Type 3): this type of thesis asks “is prediction P made by theory T accurate?” Prediction P must be interesting and non-trivial to test. The novelty in such an experimental thesis comes from the design, execution and analysis of the experiment. The evidence is partially in the form of the results and partially a logical argument that the experiment adequately tests the theory.

Some theses include all three types: that is, observations are made of a system, a theory is proposed which explains those observations, new predictions are made from this theory, and experiments are conducted to verify the predictions; this approach is probably excessive for Masters-level work however, it may be appropriate at the doctoral level.

Sources: Adapted from Phillips (n.d.)

Step 4- Working plan and time scheme:

Lastly, the research proposal should be completed by a comprehensive working plan, indicating the necessary steps for carrying out the research, as well as their logical order. Different research steps for MSc-thesis work should be distributed in a feasible manner over the available time period. Thus, it is recommended that the student develops a preliminary time schedule. The student should also agree with their supervisor(s) about the frequency of contacts as well as milestones for delivering certain parts of the thesis proposal or report. Preparing the working plan implies elaboration of a financial plan, such as costs for travel, mailing and telephone costs, field assistance (e.g. for translation) etc. The financial requirements of thesis work need to be discussed and agreed upon by the supervisor and the student before the actual thesis work begins.

Component 5: Expected results (optional)

In this section, the student reflects on research questions or hypotheses to describe what major outcomes are expected from the study. This section is also a good place for the student to assert the potential significance of her/his study, for example, the contribution the study may make to the field.

Component 6: Bibliography

In this section a list of **all** referred literature should be given, as sorted in alphabetical order with the last name of the author. Information given in the bibliography should be complete and accurate. The style for the different types of publications (articles in journals, books, chapters in books etc.) should be consistent. Some researchers prefer to mention information sources, such as policy documents and internet sources separately. Reference style shall be discussed in advance with the supervisor. Generally, references should include the following information and may be formatted as follows (APA Style):

- **Monographs:**

Last name, first name (year of publishing). *Title and subtitle*, edition. Place: Publisher.

Hollis, M. (1994). *The philosophy of social science: an introduction*. Cambridge: Cambridge University Press.

- **Journal Articles:**

Last name, first name (year of publishing). Title and subtitle of the article. *Name of Journal, Volume* (Issue), pages.

Nair, P. K. R. (2005). How (not) to write research papers in agroforestry. *Agroforestry Systems*, 64, pp. v-xvi.

- **Article in edited books:**

Last name, first name (year of publishing). Title and subtitle of the article. In First name, Last name of Editor(s) (Eds.), *Title and subtitle of edited book*, (pages). Place: Publisher.

Norman, D. A. (1983). Some observations on mental models. In D. Gentner & A. L. Stevens (Eds.), *Mental models* (pp. 7-14). Hillsdale, NJ: Lawrence Erlbaum Associates.

- **Websites and Internet resources:**

Last name, first name (date of publication). *Title of work*. Retrieved month day, year, from full URL.

Burgermeister, J. (2009, April 3). *Germany: The World's First Major Renewable Energy Economy*. Retrieved July 29, 2010, from

<http://www.renewableenergyworld.com/rea/news/article/2009/04/germany-the-worlds-first-major-renewable-energy-economy>.

Note, when a source has no author, then start citation with the title of work and follow it with the date of retrieval in parentheses and full URL. In case date of online publication is not available, use n.d.

Component 7: Preliminary table of contents

It is very useful to give a primary table of contents for the MSc-thesis in your proposal, because this gives reviewers a general idea of what the student wants to do.. The table of contents does not necessarily give all details at this early stage, and may be adjusted as the thesis work progresses. An appropriate table of contents format would identify the sections of the research proposal (problem statement, research objectives, research questions/hypotheses, etc.) and include additional titles and sub-sections relevant to the specific thesis project.

3.4. 'Go' or 'No-go' decision

In order to avoid disappointments and unnecessary waste of time on both sides, it is highly recommended that student and supervisor agree upon a deadline when a feasible research proposal must be submitted to the supervisor. The final research proposal should form the basis for a 'Go' or 'No-go' decision by the supervisor as far as the continuation of the MSc-thesis research. Normally, the 'Go' decision will be informally agreed between the student and the individual supervisor. However, in all cases where students have problems to provide an adequate research proposal within a reasonable and in advance agreed time frame, the supervisor should indicate the problems to the REM-programme director after having informed the student clearly and timely in advance about her/his negative prospects regarding the research proposal.

Writing the MSc-thesis can only be suspended once and only during the first two months after approval (unofficial deadline of the 'No-go' decision). A new topic must then be submitted within four weeks. In any case, the matter must be officially communicated with the examination office.

3.5. Carrying out the research

When carrying out the research, special attention should be given to organizational, ethical and safety aspects. Possible economical, social and technical constrains (e.g. rain seasons, harvesting time, and holidays of respondents/interviewees) should be taken into account as early as possible in the research planning process. If unforeseeable circumstances occur, the research plan should be adapted after consultation with the supervisor.

Students shall respect social, cultural and interpersonal norms and standards while conducting their research. This holds particularly true for the privacy of organizations and persons. It should be avoided that the identity of persons interviewed/involved in the MSc-thesis research is discernible in the final text, if not agreed otherwise between the respondents and the researcher. These agreements must be clearly established before information collection.

It is recommended that students clearly document all research activities, findings and sources including small details. Analytical skills should be accompanied by organizational accuracy. Experience shows that this can save a lot of time when finally preparing the thesis report. It is also recommended to keep close contact with the supervisor in the phase of carrying out the research.

3.6. Writing the thesis report

The research activities should finally result in a comprehensive, consistent and concise thesis report. The thesis report in average **has a size around 60 to 80 pages** (without possible annexes). It should be written according to scientific standards and using the possibilities of modern text software in the layout (Font size 10-12; multiple line spacing 1,3 to 1,5; 2,5 cm margins on the upper, right and bottom side of the page; on one sided white pages). In general, past tense is used for completed actions (“methods”) and observations (“results”); present tense is used for generalizations and statements of general validity (such as “introduction” and “conclusion”) (O’Connor,1991:96)

In general, the following parts structure the thesis report:

- **Outline / Table of contents:** This part provides an overview of the chapters’ structure with the respective page numbers. When annexes are used, they should also be included into the outline of the thesis.
- **Overview of tables and figures:** The outline is followed by an overview of the tables and figures in the text, including the respective page numbers.
- **Summary:** This section provides a short, but comprehensive summary of all chapters. The length should not exceed one A4 page.
- **Introduction:** This part includes the problem statement, the scientific objectives as well as the research questions (see also chapter “Research proposal”). It can be completed by a characterization of the type of work (referring to the first step in the methodology/research design part of the research proposal) and a short outline of the red line and the structure of the subsequent chapters.
- **Preliminary theoretical frame/literature review on the topic:** In this section the critical review of the theoretical and/or empirical literatures will be provided, which forms the indispensable basis for a deeper understanding of the topic. The theoretical framework in social science thesis is very often completed by a conceptual model, in which the relations of the relevant concepts of the applied theories are presented. In natural science and engineering science, the student summarizes here the applied sweeping theory or model, on which the overall research is based (see also chapter “preparation of a research proposal”).
- **Methods:** In contrast to the research proposal, where methodology/research design presents the ambitions plan, the method section in the thesis report presents how data was collected and analysis (see also section “research proposal”). All relevant details associated with data collection and analysis have to be presented in a comprehensive and transparent manner. Moreover, the choice of research instruments and methods used in the thesis as well as the unit(s) of analysis have to be justified. It is required in order to enable the reader to repeat the empirical work if necessary (which in principle should lead to similar results), to assess the reliability of the methods and to judge upon the results of your empirical work (O’Connor, 1991:61).
- **Results:** In this section, the results should be presented in the most objective, comprehensive and transparent manner possible. Mixing results, interpretation and discussion should in any case be avoided. The challenge is to structure the results section in such a way that the research questions are best addressed. Where appropriate, the findings should be illustrated or summarized with tables and figures. “Appropriateness” means that tables/figures are employed in such a way that they provide added value compared to ordinary text. It does not however mean that the explanation of the “meaning behind” tables and figures should be omitted. Also, students

should not forget to include explanations of measurements and abbreviations. Color figures should be avoided, and preference should be given to gray scales or textures. Reference to tables, figures and boxes should be made in-text (e.g., see Table 1; Figure 2; Box 3). Note that table captions are given above the table, whereas figure and box captions are placed below.

- **Discussion:** The student evaluates and interprets the results in this section. The findings should be discussed within the background of research objective(s) and research question(s)/hypotheses, as well as in the light of the empirical literatures and the chosen theoretical framework. Literature references are therefore a requisite in this section.
- **Conclusions:** This section brings together the most important reflections in the student's perspective on her/his research. These conclusions normally touch upon three aspects: a) significance of the results; b) hints for future research on this topic; and c) limitations of the study (how findings might have been influenced by the chosen methods - e.g., possible shortcomings, special circumstances).
- **Bibliography:** In this section a list of all referred literature in the thesis should be given, as sorted in alphabetical order starting with the last name of the author (see also section "preparation of a research proposal").
- **Annex/Appendix:** The annex should include information, which can be left out in the direct text body, but which is relevant for the understanding of the research process or of important steps of it. This could mean, for example, the inclusion of the original data, the list of interviewed persons, background information on the study area, the questionnaire and further detailed statistical analysis. Note also that the annex pages should be numbered consistently with the general text.

The presented structure of the different parts at the same time also reflects the standard chapter structure of a scientific report, with the "Introduction"-section forming chapter 1, the "Theoretical framework" forming chapter 2, and so on. However, different types of research might require a slightly different chapter structure.

3.7. Colloquium requirements

Colloquium requirements depend on the individual supervisor. It is recommended that the student presents her/his research to a broader audience (such as other students, researchers from within and outside the university, and other interested persons) at least once. For training purposes, it would be even better if the student was required to hold a start colloquium (presenting the research proposal) and a final colloquium (presenting the research findings).

The presentation should follow the standards for oral presentations, such as clearly addressing the audience with a comprehensive, consistent and logical structure. It is highly recommended to support the presentation by visual tools, such as Powerpoint presentations. The student has to inform organizer of the colloquium about the technical requirements timely enough in advance of the colloquium.

3.8. Submitting the thesis to the examination office ("Prüfungsamt")

The thesis must be submitted **directly to the examination office** by the submission deadline at the latest (date of postmark); it can also be submitted earlier. It is the sole responsibility of the student – and not the supervisor - to stick to the deadline. The student must submit **three copies** of the thesis. Each copy (one-sided white pages) must be bound. Spiral binding is not an accepted format for the submission of the thesis. If the master thesis is submitted after the date stated in the letter of

confirmation sent to the student by the examination office, the master thesis will automatically be graded as “unsatisfactory” (5.0) and the student will fail.

The title page must contain the following information (see Annex C: Title page for details):

- exact title;
- name of the student;
- ID-(Matrikel) number of the student;
- name of the MSc-programme;
- names of the first supervisor and the second examiner; and
- date and place of submission.

The MSc-thesis must include a page on which the student attests that she/he has completed the thesis without external aid, using only the sources and materials indicated and that she/he has not previously submitted the document in question as a MSc-thesis elsewhere (see Annex D: Declaration of own work). It is usually included into the thesis report after the title page.

4. Administrative issues and grading

4.1. Costs associated with carrying out the MSc-research

All MSc-research should be planned in such a manner that no project finances or external funding has to be acquired. In any case, it should rely as much as possible on existing administrative and logistic support. If despite all efforts costs are unavoidable (e.g., for traveling to interview partners), the student has to provide in timely advance a financial plan, which has to be agreed upon by the supervisor. All costs made without the a priori agreement of the supervisor have to be carried by the student her- or himself.

Acquiring funding for carrying out thesis research (if necessary) is the responsibility of the student. The Faculty of Forest and Environmental Sciences does not have funds to support thesis research. Some (limited) funding might be available through the foundations at the University of Freiburg

The printing cost of draft versions as well as the three copies of the final thesis has to be covered by the student. This arrangement does include color prints (for example of figures, photos, title page). It is therefore highly recommended to use gray scales or textures with figures and photos from the very beginning.

4.2. Qualifying for an extension: falling ill and other exceptional situations

An extension of a maximum of four weeks is possible only in exceptional cases. This requires the submission of a written application. Requests for extensions must be submitted to the examination office **immediately when they occur** (thus not at the end of the thesis time, when the student is realizing that she/he is running out of time due to this exceptional situations) and no later than two weeks prior to the submission deadline of the thesis. The request must be approved and supported by your supervisor in writing.

Should the student fall ill during the writing of the master thesis she/he must submit a doctor's certificate to the examination office immediately. The doctor has to attest to the student's illness by filling up the “*Bescheinigung der Prüfungsunfähigkeit*” form, which can be downloaded from the examination office website. The student will be

granted an extension for the duration of her/his illness. Note, the examination office can only accept illnesses that clearly prevent students from working on their thesis!

4.3. Dissemination of final thesis report

The master thesis is seen as an official examination document. For privacy reasons the University Law does not allow, just as with other examination types, that the results of examinations are made public. This is also why master theses at the University of Freiburg are not made available in libraries. If additional copies of the final thesis report are required (e.g. for organizations which co-operated in the research), approval on how results are disseminated is needed from the supervisor.

4.4. Thesis evaluation

The thesis will be evaluated by the supervisor and the second examiner within six (6) weeks after submission. The final grade of your master thesis is the average of the two grades awarded by the two examiners. Feedback on the student's performance during the "training" process of preparing the MSc-thesis will be provided in written form. The thesis evaluation usually touches upon the following criteria for judging the quality of a scientific work, namely (see Annex B1: Optional structure of thesis evaluation sheet (subject to individual preferences of supervisors) and Annex B2: Evaluation sheet of Fraunhofer - ISE for details):

- **Content aspects** focusing on a) problem statement; b) objectives/research questions; c) theoretical/analytical framework; d) methods; e) results; f) discussion; g) conclusions; h) logic of chapter structure; i) comprehensiveness of literature review;
- **Formal aspects** focusing on a) scientific text style; b) accurateness of citations; c) quality and appropriateness of tables and figures; d) quality of layout according to modern text processing standards; e) completeness and consistency of the bibliography;
- **Working process** focusing on a) specific difficulties (e.g., thesis report in an other than the mother language) and unforeseeable problems (e.g., illness of interview partners); b) degree of independence, with which the research has been carried out as well as student's ability to integrate comments of the supervisor; c) work progress within the given time frame of (usually) 26 weeks;
- **Remarks** allowing for additional comments of the supervisor about the training process of the student. For instance, the evaluation of work process additionally includes sense of responsibility, information exchange, etc. for the student who writes MSc-thesis in Fraunhofer-ISE.

4.5. Plagiarism

Plagiarism is commonly defined as follows: "the practice of taking someone else's work or ideas and passing them off as one's own" (New Oxford American Dictionary, 2005). Plagiarism is generally (also in essays or course assignments, and not only in theses) punished severely in academic institutions. Being caught in plagiarism, students not only fail courses or the thesis assignment, but will also lose their reputation.

Following the "MCC Guide to Writing Research Papers" (2006) work can be labeled plagiarized if one of the following occurs:

1. A passage is copied word-for-word (or, in music, note-for-note, or, in art, line-by line) from someone else's work, whether the source is printed, recorded, visual, or electronic, and that source is not given credit in the required ways.
2. A passage paraphrases a source (rewords or restates the content and ideas without using the author's words) without giving credit to the source in the required ways.
3. The work is based on sources but does not give credit to any of them.
4. The work closely follows the organization of ideas or concepts in someone else's work without giving credit to that source.
5. The work has been composed, wholly or in part, by someone other than the person who submits it. This includes collaborative efforts: if a project was generated by several people, all of them must be given credit.
6. The work is "patched together" from one or more electronic sources, none of which are credited. These sources may be downloaded or printed out, or purchased wholly from a "research paper retailer."

As the "MCC Guide to Writing Research Papers" (ibid.) continues, any suspicion of plagiarism can be avoided by documentation:

- **Quotation Marks:** When using words (three or more consecutively) copied from the source, put them in quotation marks, which means, "this is exactly what someone else said." Be sure to copy accurately and do whatever is needed to make the quotation grammatically correct. A quoted passage should generally not be longer than one paragraph.
- **Paraphrase:** It is a restatement of a passage from a source in the research paper in writer's own words. Unlike summaries, which are shorter than the passage summarized, paraphrases are about as long as the passages on which they are based. Like quotations, paraphrases are used to support a point a writer makes in his research paper. They have to be documented.
- **Citation:** It documents both direct quotations and paraphrases. The exact place the material comes from is stated or "cited" for the reader, in shortened form, in parentheses right after the material, like this: (Katz, 2010: 18). Most contemporary forms of documentation use parenthetical citations in the text, but a few specialty forms will require notes at the bottom of the page or at the end of the paper. Ask your professor or publisher what form is required.
- **In-text Reference:** The author's name or title is mentioned in the text, either because you're using only one source or because you want the reader to know where a paraphrase begins.
- **Source List/Reference List:** A list of sources is placed at the end of the paper. "Bibliography" is the older term, meaning a list of books; most writers now prefer "Sources" or "References" or some phrase using one of those words, to include both print and non-print materials.
- **Common Knowledge:** Paraphrased statements of facts, such as statistics culled from a government research report, need to be given credit as well.

4.6. Grading

The final grade for the MSc-thesis is the average of the two grades awarded by the first supervisor and the second examiner. The grading will be based on the standard grading scale at the University of Freiburg ranging from one (excellent) to five

(insufficient). To pass, the Msc-thesis must be graded as sufficient (4.0) or better. The grading will take into account all elements and steps in the preparation of the MSc-thesis, possibly including the oral presentations. However, main emphasis will be given to the final thesis report.

5. Literature

5.1. Finding literature for the thesis research

Beside the literature's [search facilities](#) provided by the Library of the University of Freiburg, the following search engines on the Internet can help students to get an overview of existing literature and relevant sources:

- [Scirus](#), own and operated by Elsevier, is one of the most commonly consulted science-specific search engine on the Internet.
- [Google Scholar](#) is a multidisciplinary web-based searching engine, which provides a simple way to search for the full text of scholarly literature.

5.2. Further readings: Introduction into social science

The following literature lists intend to provide neither a complete nor an exhaustive overview on helpful and interesting further readings when starting to write an MSc-thesis. It mainly focuses on standard publications which are easily accessible at the libraries in Freiburg and from which the student can start the search for more detailed literature relevant for her/his specific topic.

- Fuller, S. (1997). *Science*. Buckingham: Open University Press.
- Stevenson, L. & Byerly, H (1995). *The many faces of science: an introduction to scientists, values, and society*. Boulder: Westview Press.
- Hollis, M. (1994). *The philosophy of social science: an introduction*. Cambridge: Cambridge University Press.
- Trigg, R. (1985). *Understanding social science: a philosophical introduction to the social sciences*. Oxford: Blackwell.

5.3. Further readings: methodology and statistics in social sciences

- Aron, A. & Aron, E. N. and, Coups, E. J. (2007). *Statistics for the behavioral and social sciences*. Upper Saddle River, NJ: Prentice Hall.
- Berg, B. L. (2001). *Qualitative research methods for the social sciences*, 4th ed. Boston: Allyn and Bacon.
- Bohrnstedt, G. W. & Knoke, D. (1994). *Statistics for social data analysis*, 3rd ed. Itasca: Peacock.
- Booth, W., Colomb, G. G., & Willimas, J. M. (2003). *The craft of research*, 2nd ed. Chicago, IL: The University of Chicago Press.
- Bryman, A. & Cramer, D. (2001). *Quantitative data analysis with SPSS Release 10 for Windows – a guide for social scientists*. London: Routledge.
- Cohen, B. H. & Lea, R. B. (2003). *Essentials of statistics for the social and behavioral sciences*. New York: John Wiley.

- Cohen, L. & Holliday, M. (1996). *Practical statistics for students*. Thousand Oaks, CA: SAGE Publications.
- Creswell, J. W. (2005). *Educational research, planning, conducting, and evaluating quantitative and qualitative research*, 2nd ed. Upper Saddle River, NJ: Pearson.
- Dale, A. & Davies, R. B. (1994). *Analyzing social and political change - a casebook of methods*. London: Sage.
- Denzin, N. K.; Lincoln, Y. S. (2000). *Handbook of qualitative research*, 2nd ed. Thousand Oaks, CA: SAGE Publications.
- Dunn-Rankin, P., Knezek, G. A., Wallace, S., & Zhang, S. (2004). *Scaling methods*, 2nd edition. Mahwah, NJ: Lawrence Erlbaum Associates.
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- Punch, K. F. (2000). *Developing effective research proposals*. London: SAGE Publications.
- Sirkin, R. M. (2005). *Statistics for the social sciences*. Thousand Oaks, CA: SAGE Publications.
- *SPSS 7.5 Statistical Algorithms (1997)*. Chicago: SPSS.

5.4. Further readings: engineering research

- Auyang, S. Y. (2006). *Engineering: an endless frontier*. Cambridge, MA: Harvard University Press.
- Petroski, H. (2000). Reference Guide on Engineering Practice and Methods, In *Reference Manual on Scientific Evidence*, 2nd edition (pp. 577-624). Washington, D.C.: Federal Judicial Center. Retrieved February 23, 2010 from [http://www.fjc.gov/public/pdf.nsf/lookup/sciman00.pdf/\\$file/sciman00.pdf](http://www.fjc.gov/public/pdf.nsf/lookup/sciman00.pdf/$file/sciman00.pdf).

5.5. Additional internet resources

- [Learningforsustainability.net](http://learningforsustainability.net)
("This page lists some on-line resources for both research students and their supervisors. Topics covered include developing your supervisory team as well as structuring and writing your thesis or dissertation. The links here pay particular attention to students doing integrative research, although they will be of interest to many students from a range of disciplines. Special attention is paid to using action research for theses. Some resources are also included to help thesis supervisors, examiners, and students who want to see what examiners may be looking for.")

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- Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Thousand Oaks, CA: SAGE Publications.
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- Katehi, L., Pearson, G. & Feder F. (Eds.) (2009). *Engineering in K–12 Education-Understanding the status and improving the prospects*. Washington, DC: The National Academies Press.
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- Mey, G. & Mruck, K. (Hrsg.) (2007). Grounded Theory Reader. *Historical Social Research*, Supplement 19.
- New Oxford American Dictionary* (2005). Ed. by McKean, E. 2nd ed. *Oxford Reference Online*. Oxford UP. Retrieved on September 26, 2006 from <http://www.oxfordreference.com/>.

O'Connor, M. (1999). *Writing Successfully in Science*, 1st ed. London: Taylor & Francis Group.

Phillips, G. (n.d.). What is an engineering thesis, anyway? A concise guide to a frequently unasked question. In *Greg's Graduate Guide*. Retrieved on February 15, 2010 from <http://phillips.segfaults.net/notes/thesis.html>.

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Annex A: Checklist of actions and responsibilities

| <i>Action</i> | <i>Degree of choice</i> | <i>Who</i> |
|---|-------------------------|---|
| 1. Fixing thesis topic with supervisor | Obligatory | <i>Student</i> |
| 2. Contacting 2 nd supervisor | Obligatory | <u><i>Student</i></u> , <i>supervisor</i> |
| 3. Registration of thesis at the examination office ("Prüfungsamt") contract, signing by student and supervisor (No later than three months after the examination completing the final module) | Obligatory | <i>Student</i> |
| 4. Examination office will send confirmation letter and determine the submission deadline | Obligatory | <i>Examination office</i> |
| 5. Start working on your thesis only upon receipt of the letter of confirmation | Obligatory | <i>Student</i> |
| 6. Preparation of research proposal (according to individual agreements with supervisor) | <i>Optional</i> | <i>Student (supervisor)</i> |
| 7. Arranging date for colloquium presentations (according to individual agreements with supervisor) | <i>Optional</i> | <u><i>Student</i></u> , <i>colloquium coordinator</i> |
| 8. Approval of research proposal – Go-/No-go decision (according to individual agreements with supervisor and no later than six weeks after official start) | <i>Optional</i> | <u><i>Supervisor</i></u> , <i>student</i> |
| 9. Thesis work | Obligatory | <i>Student (supervisor)</i> |
| 10. Submitting three copies of final thesis to examination office (no later than individual deadline as mentioned in the official letter from examination office) | Obligatory | <i>Student</i> |
| 11. Distributing copies to supervisor and second examiner for evaluation | Obligatory | <i>Examination office</i> |
| 12. Writing evaluation report, grading of thesis | Obligatory | <i>Supervisor</i> , <i>2nd examiner</i> , |
| 13. Administrative finalization: <ul style="list-style-type: none"> ▪ grades to examination office, ▪ evaluation report to examination office ▪ copy of evaluation report to student | Obligatory | <i>Supervisor</i> , <i>2nd examiner</i> , |

Annex B1: Optional structure of thesis evaluation sheet (subject to individual preferences of supervisors)

| | |
|----------------|--|
| Student | |
| Thesis Title | |
| Credits | |
| Supervisor | |
| 2nd Examiner | |
| | |

| | |
|--------------------------------------|--|
| Content | |
| <i>Problem statement</i> | |
| <i>Objectives/ Research question</i> | |
| <i>Theor. / analytical framework</i> | |
| <i>Method</i> | |
| <i>Results</i> | |
| <i>Discussion</i> | |
| <i>Conclusion</i> | |
| <i>Chapter structure</i> | |
| <i>Literature</i> | |

| | |
|--------------------------|--|
| Formal Aspects | |
| <i>Text style</i> | |
| <i>Citations</i> | |
| <i>Table and Figures</i> | |
| <i>Layout</i> | |
| <i>Bibliography</i> | |

| | |
|----------------------------|--|
| Working Process | |
| <i>Difficulty/Problems</i> | |
| <i>Independence</i> | |
| <i>Progress</i> | |

| | |
|----------------|---|
| Remarks | |
| | - |

Overall Grade

Summarizing the given arguments, the work is graded with

Freiburg, - Date

(Signature Supervisor)

Annex B2: Evaluation sheet of Fraunhofer - ISE

Thesis title

Author

Master Thesis

Content-based evaluation

Structure
 Problem statement
 Narrowness of the topic
 Literature, state-of-the-art
 Research approach/Methodology
 Quality of the results

| Note | 1 | 2 | 3 | 4 | 5 | n.A. |
|------|---|---|---|---|---|------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Total 0,00

Formal evaluation

Linguistic competence
 Presentation

| Note | 1 | 2 | 3 | 4 | 5 | n.A. |
|------|---|---|---|---|---|------|
| | | | | | | |
| | | | | | | |

Total 0,00

Miscellaneous

Independency
 Information exchange/contact
 Commitment
 Sense of responsibility
 Time management

| Note | 1 | 2 | 3 | 4 | 5 | n.A. |
|------|---|---|---|---|---|------|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Total 0,00

Overall grades

Content-based evaluation 0,00
 Formal evaluation 0,00
 Miscellaneous 0,00

Total **0**

| |
|----------------|
| Remarks |
|----------------|

Annex C: Title page

| | |
|--|--|
| <p style="text-align: center;">University of Freiburg</p> <p style="text-align: center;">Faculty of Forest and Environmental Sciences in cooperation with ZEE – Centre for Renewable Energy</p> <p style="text-align: center;">>TITLE<</p> <p style="text-align: center;">Master thesis submitted in partial fulfilment of the requirements for the Degree of Master of Science in Renewable Energy Management</p> <p style="text-align: center;">by</p> <p style="text-align: center;">>Name of a student<</p> <p style="text-align: center;">Student ID: xxx</p> <p style="text-align: center;">REM M.Sc. Renewable Energy Management ALBERT-LUDWIGS-UNIVERSITÄT FREIBURG</p>  | <p>First Examiner: xxx</p> <p>Second Examiner: xxx</p> <p>Scientific Supervisor: only if necessary</p> <p>Freiburg i. Br.,</p> <p>Date of submission Month (e.g. September), Day (e.g. 30), Year (e.g. 2010)</p> <p style="text-align: right;"> </p> |
|--|--|

Annex D: Declaration of own work

I, (Name, Surname) declare that this master thesis titled "Title of Master thesis" has not been submitted elsewhere and was produced without external aid and is entirely my own work. All materials which have been used in the research are quoted or acknowledged as appropriate.

Place, Date

(Signature Student)
Name