

GUIDELINES FOR RESEARCH PROJECTS AT THE UNIVERSITY OF GRONINGEN

The research projects generate experience in each of the stages of research: planning, data collection, analysis, writing and presentation. The emphasis of the first research project is on proper training and guidance in each of these stages – more than on obtaining truly breakthrough results. Thus the topics chosen are usually not technically risky, so that a clear result can be reasonably expected. The second research project repeats all of the stages but now with a great deal more independence of the student.

A research project comprises the following phases:

1. Planning and preparation of research: Students start discussing the project with the supervisor, reading relevant literature, writing up a literature review and methodological planning of the research project.
2. Data collection and analysis: Data will be collected according to the agreed research plan.
3. Presentation: Towards the end/at the end of the research project a presentation is given to a scientific audience (usually the research group).
4. Report: Results will be written up in a report which includes the literature review and methodological plan written initially, and further a presentation and analysis of the data obtained, and a discussion of the results in terms of the research question addressed.

The responsible supervisor will keep track of progress of the work and in particular of the writing in weekly sessions. He or she will keep track of attitude, motivation and quality of the work during data collection, judge the quality of the report and the oral presentation and give a motivated proposition for the grading.

The Course Committee has decided on the following regulations regarding both research projects:

- The first research project always is an internal project. Internal projects must be performed at the FSE (life sciences related research institutes) or the UMCG under the direct supervision of one of the examiners appointed by the Board of Examiners. An internal project done at one of the MEME partner universities will also be considered an internal project;
- Before starting a research project at the University of Groningen (internal or external) you need approval for your project via a proposal form, first approved by your mentor (Leo Beukeboom) and finally approved by the Board of Examiners. You can find the link to the proposal form [on the student portal](#).

How to fill out the form:

- Enter relevant data for Name, Student number and Start of the programme;
- For Master programme choose: Ecology & Evolution;
- For Track write: Evolutionary Biology (MEME);
- Your Study Mentor is: L. W. Beukeboom;
- Enter the date of submission and check the relevant box for items to be approved;
- If you first project was done at one of the partner universities please also enter this info:
 - Check the Internal project box;
 - For examiner write down your examiner and the partner university;
 - For research group: the relevant group at the partner university
 - Enter the title in the relevant space available;

- In the Short description field: mention that your project was done at a MEME partner university, what it was about, which grade you received and whether it was a passing grade. Finally state that the transcript for this grade will be sent by the MEME Administrative Coordinator as soon as it becomes available;
- Enter Start date, End date (Midterm date is not applicable) and number of ECTS (30).
- If your first project was done in Groningen (and you are now filling out a proposal form for your second project, also in Groningen, you only have to fill out the info under Second Research Project;
- If you are doing an external project for the second research project, then fill out the following:
 - Tick the box External project
 - For Examiner: enter your Groningen examiner as well as your daily supervisor at your external location (including the name and location of the university);
 - For Research group: fill out both the internal and external research groups.
 - Fill out the Title, the Short description and the Start, Midterm and End dates (remember, a 30 ECTS project takes 21 weeks in Groningen) and finally the number of ECTS (30).
- For an internal Second Research Project you should of course tick the Internal project box and fill out the form with all the local information.

Important note: when sending in the proposal form to the Board of Examiners, make sure you CC Leo. Your proposal will not be approved by the Board of Examiners before Leo's approval;

- A second research project may be external (performed in a research group not directly related to the programme, outside the university or abroad);

- An external research project is conducted under the supervision of one of the examiners of the master programmes. You can find the list of approved examiners [on the student portal](#). The examiner always is the first assessor. External projects are assessed based on the advice of the second assessor (the daily supervisor) about the daily performance of the student, the final report and the oral presentation given in the group of the examiner in Groningen;

- In case of an external project, the student is expected to send a 'letter of introduction' to the daily supervisor (which surmises what is expected of the daily supervisor regarding the execution and the assessment of the project) **before** the start of the project. This letter and more relevant information regarding external projects can be found [on the student portal](#).

- A 'third semester' (internal) research project conducted at the University of Groningen will **always** start in the first week of September (this could include the last days of August depending on the academic calendar) and will finish on the last day of January. This will give you enough time (21 weeks plus one week holiday) to do a 30 ECTS research project (see calculations further down).

- A 'fourth semester' (internal or external) research project conducted at or from the University of Groningen will start **no later than** the first week of March and in (this case) will finish no later than the first week of August (21 weeks plus one week holiday).

- Both the first and the second research project (either internal or external) are classified as 'thesis' projects.

- Each research project should be concluded by a written report and an oral presentation to the research group. The report and presentation are in English. **Important note: the final report should**

be handed in on (or before) the last day of the project. The presentation has to be done beforehand. The added benefit of this is that you will be able to use feedback from your presentation in your report. Some research groups have very busy weekly meetings so you may have to 'book' your presentation time slot a few months in advance.;

- The research project report should describe the whole research cycle according to a so called IMRD structure (Introduction, Material and Methods, Results, Discussion). It should include, either in supplemental form or in main text, descriptions of all practical work, including pilots, failures, manuals, and recommendations for future research. It should be written in a way that a student continuing this project can build on this report, and use it as reference. This way, it can be assessed whether he/she can effectively communicate acquired knowledge, insights and skills to others by writing. Master students should not write their report in a condensed form suitable for publication; this is an aim for the PhD programme. Master students who wish to transform their report into a manuscript that can be submitted for publication may request to do so as a 5 - 10 EC research assignment. The final assessment form is used to mark the research project and is signed by two assessors of which one or both are examiners. An example of this form can be found [on the student portal](#). You can also find the assessment criteria [on the student portal](#).

- To complete the student's dossier for the Board of Examiners, the final report should be uploaded to the FSE repository, according to the instructions on the Student portal;

MANDATORY UPLOAD OF YOUR REPORT

As part of the quality assurance of a degree programme, the programme is obliged by law to archive all kinds of written (end)work of students. You need to upload the documents to the electronic repository of the University of Groningen, according to the instructions below. The final PDF-document should be named like this:

[PROGRAMMECODE]_[Year]_[Name of author].pdf

For example: mEE_2020_SmithAB.pdf (The programme code for MEME is mEE.)

Please note: it is mandatory for students to submit the above-mentioned document, **otherwise your grade will not be processed** in ProgressWWW! Your final grade will only be processed by the ESC, after having received the assessment form AND a confirmation of correct submission to the repository. The confirmation email of the upload will be sent to your email address, as well as to the email address of the ESC. Please note that your uploaded document should be the final version of the assignment (the one that is graded, so not the first or concept version).

The document will not be made publicly available via the Internet without the consent of you and your supervisor. Discuss with your supervisor if your document should be made freely accessible or not. If not, only the title and author of your work will be made public. In case (during the upload process) you indicate that your document should be accessible for the general public, your supervisor will be asked (by email) for permission before publication.

Instructions to upload your document to the repository

1. Prepare your document in PDF, using the name as instructed above.
2. Visit the [submission website](#) and follow the various steps to submit your document. Fill in at least all the fields that are marked with a red asterisk. **Please note:** you need to use a computer from the University of Groningen (or use uwp.rug.nl) to be able to upload your document.

3. Click on 'Deposit'. A confirmation of the upload will be sent to the provided e-mail address.

In addition, the following guidelines apply to the organization and implementation of both projects:

- Before the start of the research project, clear agreements will be made with the student, preferably in writing, about the schedule (starting date, completion date for practical work and completion date for the research project). Notice the following rule: In the Netherlands 1 ECTS is 28 hours. 30 EC stands for 30*28 hours study load (1120 hours), divided by the 40 study hours of a full time week (in the Netherlands) gives 21 weeks.;
- Regular progress meetings (at least every four weeks) with the direct supervisor will take place, in which the student will be given clear feedback on his or her progress.
- Halfway through the project, the supervisor will complete a *midterm assessment form* in the presence of the student. The form is then forwarded to esc-lifesciences.zernike@rug.nl for inclusion in the records of the Board of Examiners;
- Arrangements for extensions of 5 - 10 EC may be made during the midterm assessment only **with approval from your mentor (Leo)**. After the midterm assessment extensions are not allowed. Please note: **any delay of any kind (e.g. with the collection or processing of data) or any major change of your research question during the research project should immediately be reported to your mentor (Leo)**.
- The practical work must be completed in good time so that the report can be written within the total agreed period for the project. The time required will depend on the nature of the research project, but as a rule it should take three to four weeks.

Hints for the research report

Structure

The report on your research project should contain a title, an introduction to the research question, followed by a chapter outlining the research methodology, a chapter presenting the findings and finally a section which looks at the conclusions to be drawn from this, plus a discussion (IMRD structure: Introduction, Material and Methods, Results, Discussion). The literature cited should appear in a bibliography. For reasons of clarity, a table of contents and an abstract are **included**, and optionally a preface/afterword and/or appendices. Please take notice: Before you start with the full report, make an outline and discuss it in detail with your supervisor! Hopefully, this will save you the disappointment of having to radically restructure.

Title

The title should succinctly convey the topic of the research project; avoid unnecessary frills ('Some contributions to the knowledge of...' etc.). Where possible, use a subtitle. The title should appear on the title page together with the author, date, research group and supervisor. The sources for any figures on the title page should be reported on the inside page.

Abstract

This is a very brief summary of the essence of the report (no more than half an A4 page). Stick to the main points and avoid too much detail.

Table of contents

Make sure that the page numbers in the text are correctly listed in the table of contents. If necessary, you can subdivide chapters into sections and subsections, but avoid a three or four-step subdivision.

Introduction

Here you should work from the literature towards the research question, using all the information that is relevant to your argument. The source of cited literature should be given in brackets. A good way to structure your introduction is to focus gradually on your particular research topic against a background of the broader research area. The research question will then follow logically from the introduction. Finally, you should formulate the research question/hypothesis explicitly.

The introduction should outline in brief only the theory and literature that leads directly to the research question. It is very important not to put everything relating to the topic in the introduction.

Most important is to formulate a good research question. This should occur naturally to the reader as a result of your presentation of the known facts. The research question can be of a purely exploratory nature, or the arranging of known facts can produce a hypothesis to be tested in your research. It is then important to predict as accurately as possible the outcome of the research on the basis of this hypothesis. Comparing your predictions with the actual findings will maximize the possibility of new insights.

Materials and methods

Here you explain how the experiments were carried out, how they were designed and what the experimental set-up was. Use figures to supplement, shorten or clarify the text. Where relevant, say when the experiments took place (refrain from describing your log in terms of time investment). Demonstrate clearly (perhaps with an example) how and in what form you collected and processed your data. Describe the statistical approach you used. If your experimental set-up and methodology differed from the literature, you must describe them in

detail. If you used established methods, a brief description, with a reference to the literature, will suffice.

Results

Present the findings in brief using the figures and tables. Emphasize the points that relate to the research question, first the main points and then any interesting details. Figures and tables form the basis of this part of the report. Present the results point by point and in a logical sequence. Avoid giving the same information twice in a different form. Generally speaking, tables should be used to make numerical comparisons and graphs to show or compare trends. Be aware that an interpretation is already inherent in the way in which you present and summarize the findings. This is where your conclusion begins to take shape. Be meticulous about your statistical approach. Report the number of measurements, the margins of error and whether certain trends or differences are significant.

Conclusions and discussion

First of all, take a positive global look at the results, and only then go into detail. State explicitly the conclusions arising from the results and discuss or substantiate them from the literature. Distinguish between direct conclusions and further interpretations. You may also point out positive or negative aspects of the method used, and explore the question as to why you arrived at these particular findings and whether they match your expectations. Finally, you may make recommendations for further research. You can draw conclusions from the results, stating your arguments for doing so.

Where possible, test the conclusions against your own expectations or the literature, being as specific as possible. Argued speculations may be included, but avoid risky suggestions or vague assumptions.

If the results do not confirm your hypothesis, don't immediately assume all manner of vague 'errors of measurement' or 'inaccuracies' (nor should you do so if the findings do match your expectations). If there is a specific reason for this, try to assess the effects of a particular error or anomaly on your results. Do not immediately start to qualify the results in favour of the hypothesis. If you have measured properly, accurately and reliably, your results are facts; the hypothesis was only an intellectual construct.

Bibliography

This should contain all the cited literature. Follow the conventions used in recent editions of reputable journals.

Appendices

It may be useful to include the raw data as appendices to the report. This allows the reader to check your results or to process them in some other way. Present the raw data in the form of graphs and tables that are referred to in the report. Each appendix should have an identifying number or letter and a heading.

Preface/Afterword/Acknowledgements (optionally)

This is where you state the reasons for or objectives of the research which are not part of the academic objective; words of thanks, etc.

Layout and appearance

A research report should be well presented so that it is inviting for the reader to read. The separate chapters, sections and other parts should be clearly reflected in the titles and headings. Pay attention to the layout of figures and tables (e.g. the space around them, captions, the space they take up in relation to their significance, etc.).

General layout

Label all graphs, drawings, diagrams, figures etc. as 'figures' and number them consecutively. In the text, refer to tables and figures by their number. The function of tables is the succinct presentation of processed and organized data as pure findings, while graphs should give a

quick overview of the nature of the relationships investigated. Because an interpretation is often implicit in the manner of presentation, you need to constantly ask yourself which of the two types is most appropriate for particular findings. Often, graphs are the preferred form.

If you opt for tables, make sure that they are small, legible and clear. (Large quantities of data can be included in tables in an appendix.) The caption (located above a table and below a graph) should explain what the table or graph represents, usually without reference to the text. Above the columns of a table and along the axes of a graph, state which variable is plotted and the units in which that variable is expressed. The independent variable is set out along the horizontal axis of a graph and the dependent one along the vertical axis. The scale division along the axes always starts at zero, unless there are important reasons for doing otherwise (logarithmic scale, temperature). The scale division should not be too crude, nor too fine, and should present only round values. If the points on a graph suggest a clear relationship, you can attempt to draw a smooth curve along the dots. Otherwise,

straight lines connecting the dots must suffice. Under no circumstances may a curve suggest a greater degree of relationship than the measuring points warrant. Do not mention numbers in the text that are listed in tables, unless for a specific reason. Round numbers in tables and text correctly.

Content

You must pay attention to language use, ease of reading (not too many repetitions, clear and unambiguous sentences, etc.) and consistent subject-verb agreement. You should also consider the academic content of the Introduction, Materials and Methods, Results and Discussion:

- Have you included everything required to answer the research question?
- Have you made any claims that are not related to the research question, or that cannot be supported by demonstrable findings?
- Are the text/figures/tables clear and unambiguous?
- Are your arguments organized in a manner that is academically convincing?

Hints for the oral presentation

The final oral presentation is an essential component of a research project, and thus counts toward the final assessment. Through the presentation you learn to present your work orally and to discuss it. It allows you to show the kind of work you have done, the origin of the research question, your findings and what you have done with them. It also gives other members of the research group an opportunity to give their input into your research and the processing of your findings.

Since you may incorporate comments from the discussion into your report it is advised to do your presentation before completing your report.

Structure

The following structure is customary for your presentation:

Title

This should be short, informative and catchy. Avoid unnecessary frills ('Some contributions to the knowledge of....' etc.). You could consider a subtitle. Present the title on the first PowerPoint slide to ensure that your audience knows what your presentation is about.

Introduction

Summarize in a few sentences the work of the research group with which you have done your project. Focus gradually on your specific contribution and explain the relevance of your research. Formulate the main research question.

Material and methods

Report on the materials (e.g. nature, origin and number of the organisms) as well as the experimental set-up and techniques, and methods of analysis used, including the applied statistics. Explain the methods that your audience needs to know in order to follow your argument. Be aware of how familiar or unfamiliar your audience may be with the techniques you have used.

Results

The experimental data should be arranged and presented concisely – first all the main points, and then interesting details. Drawings, tables and graphs form the basis of this part of your presentation. Be aware that an interpretation is already inherent in the way in which you present and summarize the findings. Be meticulous about your statistical approach to the data. Report the number of measurements, the margins of error and whether certain trends or differences are significant. The effective application of statistical methods can avoid considerable confusion in the discussion.

Discussion and conclusions

Here you discuss the conclusions to be drawn from the results, complete with the arguments that you have used. In addition to the direct conclusions arising out of your findings, it is often also possible to formulate interpretations derived from these. When presenting interpretations, explain the assumptions that you have made. Test your conclusions against the literature or your own expectations or hypotheses. If certain experiments failed or kept failing during your research, try to outline the reasons for this. Negative results can also be of considerable interest. Finally, show the extent to which your research question has been answered and what the implications are for your line of research. Avoid the temptation to make risky suggestions or vague assumptions. You could end by making suggestions for further research.

Summary

A concise summary of the main conclusions from your research is very useful.

Presentation

General tips

To make sure that you stick to your speaking time and that your presentation goes smoothly, it is advisable to rehearse it several times in advance. Your research group will always make space and an audience available for this purpose.

Be aware of the audience you are addressing – the presence of members of your research group means that your presentation has to be pitched at an appropriate level. Work out in advance how you intend to use the PowerPoint slides. Do not block the audience's view of the screen.

PowerPoint slides and illustrations

When using slides, be consistent in your layout, typography and, where applicable, use of colour. Specific headings and/or colours should identify the different parts of your argument. Do not put too much information on one slide. Make sure that the letters are large enough; standard font sizes are usually too small! The illustrations (drawings, tables, graphs, diagrams) must be essential; in other words, leave out any that are not strictly necessary. Think hard about which illustrations you should include and what you wish to convey with each figure or table. All figures and tables should have a caption explaining what they are about, but you should also say it once more to your audience. Explain which variables are plotted along the axes of a graph and the units in which they are expressed. Make consistent use of references, abbreviations, etc.

The presentation

Almost everyone who speaks in public suffers to some degree from stage fright. One advantage of this is that speakers do not approach their task too lightly. Proper preparation is vital: know what you are going to say. It is important for both the audience and yourself not to lose the thread of your argument. Staying on track can be difficult, particularly if you are not entirely sure of yourself.

Outline in brief the key steps of your presentation on the PowerPoint slides. This will help the audience to follow your argument, and will allow you to see at a glance where you have got to. If you are worried about forgetting your text altogether, you could consider writing it out in full. Use the same words/sentences in your text as on the slides and underline them so that you can always find your place. It may be helpful to write your opening sentences out in full as the start is the most difficult and you can then rest assured that it will go smoothly. Stand where everyone can see and hear you properly. Look at the audience and try to appear relaxed. Pause briefly between the different parts of your argument to accentuate the structure. Analyse the speaking style of people who you consider to be interesting speakers – you can learn a lot from them.

Plagiarism / Scientific integrity

The RUG adheres to the Netherlands Code of Conduct for Scientific Practice, as the guiding principle for its integrity policy. All information about scientific integrity is available [on the student portal](#).

Support to write the report

You will be required to write lengthy reports during your Master's degree programme. Many students have trouble finding the discipline to write or achieving the right level of academic quality in their writing. The [Student Service Centre](#) offers various writing courses and also has a [thesis support group](#) for students who are having difficulty writing their thesis. The Faculty of Science and Engineering also has similar thesis support groups, which have the added advantage of a focus on science, instead of the broader focus you will find in the support groups for the students of other faculties. Make sure you hold your supervisor to their responsibility to provide good supervision: for example, you could agree to have a short meeting once a week to discuss your progress or to submit draft sections of your thesis for the supervisor to assess. You could also ask for a workplace in the department where you could work on fixed days. It can also be stimulating to work together with your fellow students on your theses if you cannot find the discipline to spend whole days at your computer. Contact your academic advisor as soon as possible if you get stuck and cannot find a way out.

Another interesting support group to mention is the [Methodology Shop](#) from the Faculty of Behavioural and Social Sciences. The Methodology shop is a free advisory bureau dedicated to support students and staff members from the University of Groningen with methodological or statistical questions regarding scientific research. Especially if you experience problems with statistics, this is a great way to seek support.