

# GUIDE FOR THE RESEARCH PROPOSAL

## TABLE OF CONTENTS

1. Introduction .....	2
1.1 Purpose of this guide .....	2
1.2 Purpose of writing a research proposal.....	2
1.3 Short criteria .....	3
2. The writing process.....	4
2.1 Determining a subject.....	4
2.2 Finding a supervisor .....	5
2.3 Choosing a research article as basis for your proposal.....	5
2.4 Formulating the central question and sub-questions.....	5
2.5 Writing an outline .....	6
2.6 Writing a first draft .....	6
2.7 Revising your research proposal.....	7
2.8 Submitting the research proposal .....	7
2.9 Defending your research proposal .....	8
3. Structure of the research proposal.....	9
3.1 Title page .....	9
3.2 Summary.....	9
3.3 Graphical abstract.....	10
3.3 Introduction.....	10
3.4 Description of the proposed follow-up research.....	10
3.5 A timetable for the research.....	11
3.6 Reference list .....	11
3.7 Rebuttal .....	11
4. Supervision .....	12
4.1 The role of the student .....	12
4.2 The role of the supervisor.....	12
4.3 Time path and appointments .....	12
4.4 Grading .....	12

## 1. INTRODUCTION

The research proposal is one of the mandatory parts of your research master's. Within this proposal, you describe a study that has the duration of a PhD-project. First you select a research paper as the basis for your proposal. You first need to completely understand this paper in order to come up with new questions and hypotheses. After you have established a possible follow-up study, the scientific literature should be read carefully to ensure that your question has not already been answered. Once you have this overview, you can start devising ways to test your hypotheses and explain why these are useful and realistic. You should also include a section about the societal impact of your research in your proposal.

The research proposal serves a triple goal, namely explaining why there is a *need* for your research, detailing why your research is *feasible* and *perspectives* your research. As such writing a research proposal is a valuable exercise even if you do not pursue a scientific career. You will have to sell and describe your ideas in any job, for example when writing quotations.

### 1.1 PURPOSE OF THIS GUIDE

The purpose of this guide is to offer you an overview of the proposal writing process, the structure of a research proposal and the expectations regarding supervision. This will hopefully lead to easier and more enjoyable writing and might solve the problems you come across. A specific guide that might be useful is Martyn Denscombe's *Research Proposals, A practical guide* (Open University Press). This book is available online through the university. Supervisors and students can decide to deviate from these guidelines, if agreed at the start of the writing process.

### 1.2 PURPOSE OF WRITING A RESEARCH PROPOSAL

The purpose of writing this research proposal is learning to explain the need and feasibility of your ideas and to sell them to an audience of peers. Writing a research proposal will help you to reach the following learning outcomes as formulated in the *Education and Examination Regulation*. You will be:

1. Capable, based on broad and up-to-date knowledge of biological and/or biomedical processes, in combination with specialist knowledge (theories, methods, techniques) and research experience in at least one sub-area of this field, of setting up and conducting research aimed at acquiring new knowledge and insight in this research area;
2. Capable of formulating new questions and hypotheses in the biological/ biomedical field, and familiar with the research methods and state-of-the-art techniques to solve them, taking into account available equipment and resources;
3. Capable of setting up and conducting scientific experiments in an independent manner, including the related controls, of using models and theories to explain the results, and of evaluating the results in terms of well-founded scientific conclusions;
4. Capable of independently identifying, critically reading and comprehending relevant, up-to date international literature from different disciplines, of discriminating essential from nonessential information, and of integrating new information in his overall view on nature;

5. Capable of using concepts from different organization levels in biology, in combination with those from physics, chemistry and mathematics, to solve a complex biological/ biomedical problem at a specific abstraction level;
6. Capable of independent professional practice whereby, depending on the chosen variant, the emphasis is put on conducting fundamental scientific research (under supervision), or on transferring or applying existing scientific knowledge, thereby taking into account his own competences;
7. Capable of defending his view and of critically evaluating other views in a scientific discussion;
8. Capable of integrating ethical aspects in his professional practice, along with the ability to reflect on the potential implications for society.

### 1.3 SHORT CRITERIA

In short, your research proposal should:

1. consist of at most 5 pages review, 3 pages discussion of a research article and 8 pages research description. In exceptional cases, the length of the research proposal might be different, but this should always be discussed at the start of the writing process (minimum 6,000 words, maximum 12,000 words).
2. be a follow-up study to a research article related to your specialization, in the form of a PhD-project;
3. contain a title, summary with graphical abstract (see 3.3), introduction with literature review and discussion of a research topic, a description of the research with an approach, objective, innovation and impact, a timetable and a reference list;
4. be supplemented by a rebuttal;
5. be defended in an interview-like setting with your supervisor or during a public presentation. If you choose this public presentation you usually do not have to write a second version of your proposal as the presentation will act as one;
6. have a workload of 6 ECTS (168 hours);
7. be written in accordance with the rules and regulations of the science faculty (<https://www.ru.nl/prospectus/science/rules-requests/education-regulations/>).

## 2. THE WRITING PROCESS

Writing can be a daunting task. However, with some advice, it may become a fun exercise as well. In this section, the writing process will be explained in more detail for each of the different phases of writing.

When you are writing your proposal there are three moments of submission:

1. The first submission (via an e-mail to your supervisor) consists of your outline that contains the main- and sub-questions of your research, a short description of the experimental procedures and the structure of your introduction. You should also add the proposed deadlines for your first and final version;
2. The second submission (via an e-mail to your supervisor) consists of the first, full version of your proposal;
3. The third submission (by uploading your review article on SPIB) consists of the revised version of your proposal and a rebuttal in which you explain how you implemented the comments of your supervisor (and peers).

During the writing process you will interact with your supervisor at least four times either via mail or in person. You should agree on the next moment during the preceding one. The four moments are:

1. Agreeing on supervision and the broad subject;
2. Discussing the outline;
3. Defending the first version of your proposal (if this is done during a presentation it is likely to be a different moment) and discussing the comments on the first version of your proposal;
4. Discussing your grade.

If you are an experienced writer already, you will probably not need the detailed instructions for each phase and reading the headers will suffice. If you feel that you would like to have more information about writing, reading (parts of) the following books may be helpful:

- Joy de Jong *Handboek Academisch Schrijven* (Coutinho; in Dutch);
- Karin Knisley *A student handbook for writing in biology* (W.H.Freeman & Co Ltd);
- Martyn Denscombe's *Research Proposals, A practical guide* (Open University Press);
- Piet Verschuren's *De probleemstelling voor een onderzoek* (Spectrum) which is in Dutch.

### 2.1 DETERMINING A SUBJECT

The first phase of writing a proposal is selecting a suitable topic. A good starting point when choosing your subject are the courses you have already followed and particularly liked. For example, *cancer-gene regulation*, *ecology of urban birds*, *flowering of arctic plants* and *neurogenesis in adults* are all suitable topics at this moment. Alternatively, you may select a topic related to your research internship. However, your proposal may not be a follow-up study to your internship. Obviously, there are many more ways to determine your subject and these can be suitable as well. Just remember that at the end of this phase you should have a topic that you find interesting.

## 2.2 FINDING A SUPERVISOR

The second phase of writing a research proposal is finding a suitable supervisor. Sometimes this phase coincides with determining a topic, as possible supervisors are already listed on the web pages or they are simply the lecturers of the courses that you found inspiring. Once you have identified a suitable supervisor, you may ask about supervision possibilities via email, but it can sometimes be helpful to talk to them in person. Usually, you will have a (short) first discussion about your plans and your supervisor might already give you a few papers to read, so you can start refining your topic. After a teacher has agreed to supervise you, fill in the details of supervision in the form that has been send to your e-mail account after enrolling for the course. By doing this you ensure that you can upload your final version in SPIB.

## 2.3 CHOOSING A RESEARCH ARTICLE AS BASIS FOR YOUR PROPOSAL

The basis of your proposal should be a research article that has recently been published in a reputable journal. This will automatically narrow down your topic. You can look for three or four research articles in reputable journals that lay in or near the expertise of your supervisor. You should give these papers to your supervisor and (s)he will choose the one on which you will have to base your proposal. When doing this, keep in mind that you will have to write a proposal for the duration of a PhD-project. The amount of data and experiments in the research paper must therefore be enough to act as a foundation for new experiments and testable hypotheses. Alternatively, your supervisor will give you a selection of papers from which you can select one yourself.

## 2.4 FORMULATING THE CENTRAL QUESTION AND SUB-QUESTIONS

Once you have selected a research article that will act as the basis for your proposal, you will have to carefully analyse it and look for possible follow-up studies. Where do new and exciting questions arise? Do you already have an idea how to answer these questions? It is a good idea to write down your ideas while analysing the research article so you can return to them when deciding on your central question. Moreover, having written this will help you greatly when writing the discussion of the paper in the introduction.

Once you have a central question that is formulated as precisely as possible it is time to explain why you are going to answer this question and how you are going to do that. As such your central question should be supported by the two following elements (also formulated as precisely as possible):

- Goal, which explains the importance of your main question;
- Specific research questions (sub-questions) that provide more details of how you will answer your main question. These research questions should be followed by hypotheses that will help in designing the experiments of your proposal.

Naturally, the goal plays a key role in *selling* your proposal and detailing the *need* of its research, while the specific research questions will help in explaining to the reader *how* you will answer the question and how this can be done in a *feasible* way.

## 2.5 WRITING AN OUTLINE

Writing an outline will undoubtedly assist the writing process. In general, this outline serves a dual purpose:

1. It helps you structure your proposal and ensures that all required sections (title, summary, etc.) are present;
2. It ensures that your sub-questions actually help in answering the main question.

When starting to write this outline, use the main question and the sub-questions you formulated in the previous phase as a starting point. These questions should be addressed in the first part of the actual proposal wherein you state the objective of your research. Each sub-question will be addressed separately in the approach of the research where you detail the ways in which you will test your hypotheses. In this section you should explain your experimental design too. It is advisable to write shortly about what the innovation and the impact of your research will be as well.

At this point you should also write an outline for the introductory part of your research proposal. The first part should provide the reader an overview about the topic of your research proposal and as such resembles a short review. Think carefully about the organisation of this section as this state of the art should logically flow into second part, namely the discussion of the research article that is the basis of your proposal.

As soon as you have finished your outline, look at it again critically. Is the order of the sections logical? Do the different sections actually contribute to answering your main question? If you find small problems with the outline change these straight away, as a problematic outline will lead to frustration and more problems during the actual writing process later on.

The actual writing process can start if you have written a satisfactory outline. Make sure that your supervisor agrees with the outline, as you might have to rewrite large parts of your proposal if you do not consult him/her. You should also add a planning to the outline, with deadlines for your first and final version. To ensure that you discuss your outline with your supervisor, you will have to send it to him/her by email. It is better to spend too much than too little time on this phase, as it will make writing your first draft much easier.

## 2.6 WRITING A FIRST DRAFT

Writing a first draft starts with the outline you have agreed upon with your supervisor. If written correctly, the outline should be your guide when writing your proposal. It is not recommendable to first read “everything” and to write it down only afterwards. This leads to problems with citing other researcher’s work and you will lose out on cross-fertilization between the literature and your text. Usually writing, reading, citing, rewriting, rereading and reformulating of sub-questions go hand in hand. Therefore, do not fear to play around with sections you have written already, it is perfectly normal to discard some parts at a later point.

A pitfall in the actual writing of a proposal is the feeling that there is just too much to do and you have no idea where to start. The best way to tackle this problem is by simply writing (but always keep an eye on your outline), even or especially when your output is not perfect yet. Moreover, if you set small goals during the writing process, you will notice that this overwhelming feeling will

disappear rapidly. Another way to help you during this phase is teaming up with another student who is also writing a research proposal or by making an appointment with the Nijmegen Centre for Academic Writing (<https://www.ru.nl/asn/english/>).

## 2.7 REVISING YOUR RESEARCH PROPOSAL

### 2.7.1 ON YOUR OWN

Once you have finished your first draft (title, summary, graphical abstract, introduction, actual proposal, timetable and reference list), it is time to revise. First check if your story is coherent and if you yourself can get through the text without any effort. If you have some problems with your own text, a reader is bound to have many more, and revising the problematic parts is important. At this point it is also useful to make sure that the different sections of your proposal are easily discernible, *e.g.* by providing clear headings and subheadings.

After you have checked for the larger cohesion of your proposal, it is time to look more critically at the individual parts. Are your arguments sound and do they contribute in answering your question? Moreover, do the arguments flow logically or are steps missing? At this point it is also a good idea to look at the structure of your paragraphs. Do they have an introduction, body and conclusion as well?

Naturally, other people will spot problems with your proposal more easily than you yourself can. Ask a friend (or another student) to critically look at your work. You can look at his/hers in return and you will see that critically looking at a proposal of someone else will actually help you to critically evaluate yours too. When this peer-review has taken place, critically evaluate the comments.

When revising, it may be useful to leave the proposal for a while, as parts that looked good one day, might actually be less clear the next. It is advisable to revise the entire proposal once more before submitting it to your supervisor for the first time. Of course, revision also includes checking grammar and spelling. Submitting the first, complete version of your review should be done via an e-mail to your supervisor.

### 2.7.2 WITH COMMENTS FROM YOUR SUPERVISOR

After your supervisor has commented on your proposal it is time to revise again. It is tempting to just accept all comments and not think that much about the changes you implement. However, always make sure you critically evaluate the comments you get and understand why you got them. To support your thought-process and enable your supervisor to understand the changes you made, you have to create a short document where you discuss the most important comments of your supervisor and explain why you did or did not implement these. If another student also looked at your proposal, you may incorporate those comments in this document as well.

## 2.8 SUBMITTING THE RESEARCH PROPOSAL

At this point you have finished your proposal and all you have to do is submit it for grading. To do this upload the final version<sup>1</sup> of your proposal on SPIB (<http://thesissubmission.science.ru.nl>). Do not forget to upload your rebuttal as well. After grading, you discuss the grade with your supervisor and get final feedback.

## 2.9 DEFENDING YOUR RESEARCH PROPOSAL

After you have submitted the first version of your research proposal you should defend it. This can be done either in a conversation with your supervisor or during a seminar of a department. Your supervisor will tell you beforehand which of the two it will be. In the case of a conversation your supervisor will ask you questions about the nature of the proposal. Why is your proposed research needed? Why did you choose for certain experiments with regard to your hypotheses? The way in which you defend your proposal will also count towards your grade.

In the case you have to give a presentation during the seminars of a department you will have to present your proposal in 10 minutes. The audience will subsequently have the chance to ask questions and discuss the proposal. The way in which you present your proposal and subsequently answer the questions will count towards your grade, too. Moreover, presenting your research proposal in such a way will act as the final version of your proposal.

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<sup>1</sup> If your proposal is of insufficient quality a third version has to be written.

### 3. STRUCTURE OF THE RESEARCH PROPOSAL

Each research proposal must comprise of the following:

- a title page (title, name of the author, student number, name of the supervisor, place and date);
- a brief summary;
- a graphical abstract;
- an introduction with:
  - at most 5 pages of literature review;
  - at most 3 pages of discussion of a given research article;
- at most 8 pages of description of the proposed research with<sup>2</sup>:
  - the objective of the research;
  - the approach of the research;
  - the innovation of the research;
  - the impact of the research;
- a timetable of the project;
- a reference list.

Apart from the proposal itself, you should also write:

- a rebuttal in which you react directly to the most important comments of your supervisor (and peers).

Details about style (tenses of verbs, active/passive voicing, citing styles, etc.) should be discussed with your supervisor.

#### 3.1 TITLE PAGE

This section is mainly meant for easy recognition of your proposal and should contain at least a title, your name and student number, MSc specialisation, the name of your supervisor, place and date. The title itself should cover the content, but also act as an invitation to start reading your proposal. An interesting title is therefore of great importance, but make sure that you do not oversell the contents of your proposal or state claims that are too bold.

#### 3.2 SUMMARY

In the summary you should explain your research proposal in the most concise way. Once again, this section is intended to draw your reader in and ensure that he will read your proposal. The summary must contain:

- background of your proposed research, *i.e.* why your topic is important;
- main question of your proposed research;
- sub-questions that help you to answer your main question;

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<sup>2</sup> This description of the of the proposed research is adapted from the 'NWO ALW Open Programme Call for proposals' .

- proposed methods and an explanation of these methods;
- impact of your proposed research.

Often the summary will also be presented as a part of the “title page”, though this is a matter of personal preference of you and your supervisor. The summary can also be backed up by several keywords that help your reader understand the content of your proposal even better. These keywords should not be present in the title already.

### 3.3 GRAPHICAL ABSTRACT

The graphical abstract has more or less the same function as the summary, however it is based solely on the description of the proposed research itself. The graphical abstract often details the biological principle you will study and how you will do this. Guidelines for graphical abstracts can be found online and differ between publishers as well. Possible examples can be found on:

- <https://www.elsevier.com/authors/journal-authors/graphical-abstract>
- [https://www.cell.com/pb/assets/raw/shared/figureguidelines/GA\\_guide.pdf](https://www.cell.com/pb/assets/raw/shared/figureguidelines/GA_guide.pdf)

### 3.3 INTRODUCTION

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#### 3.3.1 LITERATURE REVIEW

The first part of your proposal will be a review-like section in which you give the relevant background to your proposal. It is important that all the key concepts that play a role in your proposal are introduced. This section should incorporate research articles and reviews, and the synthesis of these texts should logically lead to the next section of the introduction by pointing to an interesting research topic.

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#### 3.3.2 DISCUSSING THE PAPER

In this section, you discuss the research article you used as the basis for your proposal. You should explain what the paper “discovered” and what new questions arise from these findings. You do not have to discuss the entire paper, but can focus instead on the figures, experimental procedures and hypotheses, which you have used as the basis of your own proposal.

### 3.4 DESCRIPTION OF THE PROPOSED FOLLOW-UP RESEARCH

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#### 3.4.1 THE OBJECTIVE OF THE RESEARCH

In this section you describe the scientific objective of the proposal. This scientific object flows logically from the discussion of the paper in the previous section. State clearly what your central question is and how you are going to test this. As such you should also describe your sub-questions and the testable hypotheses.

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### 3.4.2 THE APPROACH OF THE RESEARCH

In this section you need to explain how you are going to test your hypotheses. Make sure your experimental set-ups really help to answer your sub-questions and that they are the most elegant way to do so. When describing your methods also think about which model systems you are going to do and the order of your experiments. Make sure that experiments that can be done in parallel to each other will be planned as such, as experiments are bound to fail and this would derail your project. You should also state what you expect your results to be and how you will analyse your data.

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### 3.4.3 THE INNOVATION OF THE RESEARCH

In this section you will need to describe the originality and the innovative aspects of your research question and the proposed method. You should discuss what you have changed in regard to previous research and how this will further the field.

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### 3.4.4 THE IMPACT OF THE RESEARCH

In this section you will need to describe the importance of your research. You should explain who will benefit from your research and how the knowledge will be applied both within and outside the field.

### 3.5 A TIMETABLE FOR THE RESEARCH

In the timetable you should explain how you will structure your project. A Gantt chart might be useful in visualising this. In this section you should make it clear that the experiments can be carried out during the PhD-project and how the different experiments are (in)dependent from/on each other.

### 3.6 REFERENCE LIST

Correct referencing of your sources is of vital importance in proper scientific writing. Whatever style you choose, you should keep referencing consistent throughout your entire proposal. Make sure that a reference list is also present at the end of your proposal.

### 3.7 REBUTTAL

In your rebuttal you should critically evaluate the most important comments from your supervisor (and peers). Structure this document with sections for each chosen comment wherein you first cite the comment itself and subsequently explain why you did/did not implement it and how you did this.

## 4. SUPERVISION

In this section you will read about the supervision during your proposal writing process. Be aware of the fact that different supervisors have different styles of supervising; you may want to get a clear understanding of this at the start. This section can mostly be seen as a general guideline.

### 4.1 THE ROLE OF THE STUDENT

When writing a proposal you are responsible for your own work. This means that you initiate the appointments with your supervisor and come prepared to these appointments. You need to work individually and stick to the deadlines you set. Do not be afraid to make an appointment if you have questions or are stuck as your supervisor is usually more than willing to help you.

It is of critical importance that you communicate clearly with your supervisor, especially if you need to finish your proposal in a short time period in which grading also has to take place. Remember that your supervisor may well be busy and not be able to grade or have an appointment with you on short notice.

### 4.2 THE ROLE OF THE SUPERVISOR

When writing a proposal, you can expect your supervisor to advise you during your writing process, to help you if you have become stuck and to critically evaluate your outline and first version. To do this, each supervisor will have at least four appointments with you, either via email or in person (see also section 2): (i) to agree on supervision and the broad subject, (ii) to discuss the main question, sub-questions and outline, (iii) to discuss the comments on the first version, and (iv) to discuss your grade and to sign the testimonial. Apart from these four moments, you should also meet once to defend your proposal either in a presentation or during a conversation with your supervisor. Depending on the nature of the proposal and the student, more appointments between you and your supervisor may be needed, which can be discussed during one of the aforementioned meetings.

### 4.3 TIME PATH AND APPOINTMENTS

In principle, you should write your proposal during a four-week full-time period. In case you have reasons to deviate from this requirement, please discuss the possibility for a modified time frame with your supervisor. It is expected that you and your supervisor set deadlines for the outline, first version and final version. This deadline setting will also ensure that your supervisor has allocated time for providing feedback and grading. If you deviate from your deadlines tell your supervisor in a timely fashion. It might also be a good idea to make the next appointment with your supervisor when you are already at an appointment.

### 4.4 GRADING

Your supervisor will use the evaluation form (available on Brightspace) to grade your proposal. As you will notice, the weight of the different categories is not specified further, and there is the possibility to add (or omit) a category, when deciding on a specific form or style of the proposal together with

your supervisor. It is advisable to discuss grading at an early point in your writing process so you will not be surprised later on. A good moment to do this is when discussing your outline.