1. Why Soil Quality?

1.1 Who are we?
The Department of Soil Quality is a cooperation between two chairgroups:
- Soil biology and biological soil quality (group leader prof. L. Brussaard)
- Soil chemistry and chemical soil quality (group leader prof. R. Comans)

Both groups work together in research projects and in education.
More information: www.wageningenur.nl/soq

1.2 Our research

If you do MSc thesis work at our Department, most of you will participate in our current research. This deals with chemical compounds and organisms in soil. Keywords in our research are organic matter, nutrients, contaminants, biological transformation, chemical speciation, mass transport, bioavailability, soil organisms (including plant roots), soil biodiversity, greenhouse gass emissions, carbon sequestration and soil structure. We study the chemical behaviour, bioavailability and mobility of nutrients and contaminants, and the role soil organisms play herein. Our research contributes to a sustainable use of the soil as a natural resource for the provision of ecosystem services. Areas in which results of our research are applied are: soil fertility, plant nutrition, soil pollution, soil remediation, risk assessment and the biogeochemistry of greenhouse gases.

We do our research in the Netherlands in our own lab, at Dutch research institutes, and also in Asia, Africa and Latin America, in cooperation with local partners. It can be divided into several themes:

Soil Chemistry: Chemical behaviour, bioavailability and mobility of nutrients and contaminants are important aspects in our research. We need to know more about it for instance for advice on fertilization rate and for risk assessment of contaminated soils. The availability and mobility of compounds in the soil depends on their concentration in the soil solution and on the release rate from soil particles. The structure of soil aggregates and the type of reactive surfaces of soil particles like clay, organic matter and Fe-oxides determine compound reactivity. We try to understand how these soil characteristics affect the availability and mobility of nutrients and contaminants. A better understanding of these processes is of great importance for the sustainable management of soils with a high quality. We also develop tools to quantify bioavailability and mobility of chemical compounds in the soil (e.g. analysis methods and equipment, computer models for chemical speciation).

Environmental Risk Assessment and Soil Quality Evaluation: We aim to identify the processes that control the risks of contaminant mobility and bioavailability in the soil environment, and to develop methods to measure fractions of contaminants that may migrate or be taken up by biota. This knowledge is necessary to assess if it is safe or
not to live or work on a contaminated soil. It contributes to the development of reliable tools for risk assessment of soil contamination.

**Soil Biology and Biodiversity:** Soil organisms and soil biodiversity play a crucial role in ecosystem functioning. They are responsible for decomposition of organic matter and partly for soil structure and thereby play a major role in cycles of carbon, nutrients, metals and organic compounds. We study the influence of biological activity, including mycorrhizas, in soil on organic matter decomposition, the formation, stabilization and breakdown of soil aggregates and the implications for nutrient availability. This has bearings on ecosystem properties such as carbon sequestration and water and nutrient use efficiency of the vegetation or crop.

**Soil Fertility and Nutrient Management:** Soil fertility is an important ecosystem service offered by the soil. We try to better understand the role of (changing) soil fertility in ecosystem. We focus on the role of soil organisms, including plant roots and mycorrhiza, on nutrient availability (e.g. CaCl₂-extraction of soil), and on interactions between nutrients (e.g. between zinc and phosphorus). The aim of our work is to increase understanding of nutrient cycling to improve soil and nutrient management and to develop tools to support decision-making in soil and nutrient management. Furthermore we evaluate the effects of governmental policies on nutrient use and nutrient losses.

**Soils in a Changing Climate:** Climate change poses important opportunities and challenges to soil science. Sustainable soil management can considerably help to decrease greenhouse gas emissions and soils are crucial in the production of biofuels. The changing climate change has also considerable effects on the soil, the food it produces and the ecosystems it sustains. We have a wide variety on research projects related to these topics.

### 1.3 Our target group

A large diversity of students have found their way to our Department for MSc thesis work. Most of our MSc students study Earth and Environment or Environmental Sciences, but also students in Biology, Earth System Science, Plant Sciences, Organic Agriculture and Forest and Nature Conservation found interesting topics offered by us.

### 1.4 Future perspectives

Finding a job is not difficult at all. Many students find a job in research, either at universities or at research institutes throughout the world. Another large group starts a career in consultancy, for instance in the field of soil remediation, risk assessment or nutrient management. Others find a job in international cooperation or policy.
2. **Aims and Components of MSc Thesis Work**

In MSc thesis research you carry out your own scientific research project. The major aim of MSc thesis work is therefore to learn how to do scientific research at an academic level.

The thesis research includes:

- formulation of a research question or hypothesis
- gaining specific knowledge which you need for the research (literature study)
- making an experimental design and a work plan
- making a budget
- performing an experimental or modelling study (laboratory, pot and/or field work and/or computer modelling)
- arrangement, analysis and presentation of the results
- interpretation of results and drawing conclusions
- put your work in a broader context
- orientation on the field of soil quality and participation in scientific discussions
- writing a thesis report and/or scientific publication(s)
- oral presentation of your results (seminar).

Not all these activities will have the same weight in all cases.
3. **Getting Started**

3.1 **Prerequisites for a thesis**

A valid and relevant BSc diploma is needed before you can start.

Specific preliminary knowledge is necessary to start MSc thesis work efficiently. You can find the official prerequisites in the Study Guide of the academic year in which you started your MSc study. For all MSc students we recommend the bachelor courses “Soil Quality” (SOQ-21806) or “Soil Pollution and Soil Protection” (SOQ-21306) as a good preparation for a MSc thesis Soil Quality.

Depending on the MSc thesis project additional prerequisites may be formulated. This is to be determined by the supervisor after consultation with you as a candidate. Obvious courses in this respect are, for instance

- SOQ-22306 Chemical processes in Soil, Water, Atmosphere
- SOQ-32806 Biological Interactions in Soils
- SOQ-34806 Applications in Soil and Water Chemistry
- SOQ-31806 Nutrient Management
- SOQ-33806 Environmental Analytical Techniques

Details on the prerequisites for thesis studies of various length can be found in the study guide: SOQ-81324 – SOQ-81839. Please note that also your study programme may have compulsory courses in the track or specialisation leading to a thesis study in our Department. The best is to check with your study advisor if you are allowed to do your thesis study with us.

3.2 **Choice of the subject**

MSc thesis topics can be found in a separate list, also available on internet via [http://www.wageningenur.nl/sog](http://www.wageningenur.nl/sog). Navigate to *Education – MSc thesis and internship information*. If you find a topic of your interest, you can directly contact the supervisor mentioned in this list, and work out further details. If you have difficulties in choosing, you can contact one of our two professors (Lijbert Brussaard for Soil Biology and Biological Soil Quality, or Rob Comans for Soil Chemistry and Chemical Soil Quality) or Meindert Keizer (contact person education).

You can also come up with your own suggestions for research. In all cases the above-mentioned aims should be met and all components of thesis work have to be included (see chapter 2. Aims and Components of MSc thesis work).

In some cases it is also possible to work on a topic at one of the research institutes in Wageningen or elsewhere in or outside The Netherlands. In that case an expert scientist has to be available at the institute for your daily supervision.
3.3 Registration

You have to register yourself for the thesis work at the Student Service Centre (csa.wur.nl; Forum building). Remember the course code: SOQ-813xx for Soil Chemistry and Chemical Soil Quality, or SOQ-818xx for Soil Biology and Biological Soil Quality, with xx = 24 till 39 depending on the length of your thesis study. If you do not do this, we are unable to register your mark.

In addition, you have to register with our Department. You will get € 15 on your WUR card - or you can ask for it after your thesis work has been completed - to enable you to make prints and copies. Your name will be added to the e-mail list of our Department, so that you will receive relevant announcements and invitations.

3.4 MSc thesis contract

Both student and supervisor sign a contract, registering commitments regarding MSc thesis work. Among others, commitments are made on frequency of supervision meetings. The contract form (Wageningen University Master Thesis Agreement) can be found at internet on the OWI reference site under Thesis WU: Agreement. The contract will be signed by you (MSc thesis student), your daily supervisor and the official examiner, Prof. Lijbert Brussaard, Thom Kuyper or Ellis Hoffland for Soil Biology and biological soil quality or Prof. Rob Comans for Soil Chemistry and chemical soil quality. In order to do that you have to make an appointment with one of them, which also gives you the opportunity to make acquaintance.
4. **At Work**

4.1 **Your supervisor**

Your supervisor is an expert member of the scientific staff of the Department, or of the institute where you perform your thesis work. When you wish to co-operate in a current PhD research, the PhD student will normally be your daily supervisor. It is the supervisor’s responsibility to help you with keeping good progress in your work. This means that he/she will:

- introduce you to other members of the Department whom you will meet during your research work and to the secretariat
- introduce you into the subject
- take care of some literature to start with (see Appendix 1: “How to deal with literature?” for practical instructions)
- tell you where your working place is
- make a time schedule together with you
- take care that you will get admission to the necessary facilities
- discuss the results with you
- discuss your draft report and your seminar
- be present at your seminar and during your examination.

A good working relation with your supervisor is a prerequisite for good cooperation. When you encounter problems with your supervisor, it is wise to discuss these with him/her immediately. When this does not help, you can ask another member of the Department to assist.

4.2 **Research proposal and budget**

In the first quarter of your thesis work period, you will prepare a research proposal (see Appendix 2: “How to Write a Research Proposal”) and give a short presentation (start seminar). A budget has to be part of this research proposal. In a professional environment you will always have to do this in the initial phase of any project, so we consider this a valuable learning experience. Ask your supervisor for prices of your research activities. The research proposal is an excellent tool in communication with your supervisor.

You can only start with the execution phase (experimental work) of your thesis work after approval of your research proposal. The entire proposal has to be approved by your supervisor. Our Department manager has to approve the budget. Your supervisor will submit your proposal to her. If the proposal is of insufficient quality, it needs to be revised.
4.3 Work and house rules

For your work at the Department there are some house rules, which you have to obey. The rules have been developed to make sure that the available facilities can be used optimally. Some of these rules are made to secure your own safety. It is for example strictly forbidden to work in the laboratory outside the normal working hours without guidance. For laboratory, glasshouse and field work we make use of the facilities of the Chemical and Biological Laboratory for WUR (CBLB; website: www.wageningenur.nl/cblb).

Except for the supervisor you will have to deal with several other persons during your work at the Department:

- the daily guidance of laboratory work will normally be done by analytical and technical personal of the laboratory. (S)he will introduce you to safety rules.
- for plant growth experiments co-workers of the greenhouse section of CBLB will help you (head: Jaap Nelemans)
- for soil and plant analysis the people from the analytical laboratory of CBLB will help you (head: Kees Koenders)

During your stay at our Department you have to attend scientific Department meetings (see 4.5).

It is absolutely forbidden to be in the building between 22.00 and 7.00 h. Working alone in lab or greenhouse is not allowed. If you need to work outside office hours (Monday-Thursday 7.30 – 17.30 h, Friday 7.30 – 17.00), you will have to consult your supervisor and the responsible staff.

4.4 Your thesis

The thesis should contain a complete overview of the work that was done, including literature research. See Appendix 3 “How to write a thesis?” for practical instructions.

You have to prepare one complete draft. This draft is discussed in detail with your supervisor. Based on his/her comments and suggestions you prepare the version used for the oral examination. Subsequently, you have to address the final comments raised on that occasion. Of the final version three copies should be handed over: one for your daily supervisor, one for the examining full professor, and one for our library. You have to send also the pdf file of your final report to your supervisor. It will be archived in the WU-thesis database. Check at an early time with your supervisor when the thesis must be submitted to ensure that you can make your examination in time.

4.5 Seminars

During your period as an MSc thesis student with us, you are supposed to attend the Department’s seminars. Announcements are made by e-mail. Attendance of the seminars is meant mainly to broaden your view on the scientific field of soil quality and to engage in
scientific discussions. You can also learn how to give a seminar yourself by listening to others. Depending on the length of your thesis, presence during a minimum number of seminars is required. This will be mentioned in your thesis contract.

You have to give a seminar on your own research work (maximally 30 minutes presentation, followed by a discussion). This oral presentation informs interested members of the Department and colleague students about your research results. In addition, an oral presentation of your results is important as a practical training. See Appendix 4 “How to give a seminar?” for practical instructions. By attending oral presentations of others you can learn a lot and it may help you to prevent mistakes. The date of your own presentation should be agreed upon with your supervisor and examiner. The secretary does the final planning and the announcement. You may ask your supervisor to attend a rehearsal and give suggestions for improvement.
5. Examination

5.1 Oral exam

An oral examination concludes your thesis work. Both the responsible official examiner - prof. Rob Comans (Soil Chemistry and chemical soil quality) or prof. Lijbert Brussaard, Thom Kuyper or Ellis Hoffland (Soil Biology and biological soil quality) - and your supervisor will be present. In case you did your thesis work outside our Department, also your daily supervisor has to be present. During this examination the research project will be discussed on the basis of your final thesis. You are expected to be able to explain and defend your results and conclusions.

5.2 Evaluation

At the end of the examination the mark will be given. The mark will mainly be based on your performance during the execution phase of your thesis work.

We will use the rubric to evaluate your performance. This can be found at internet on the OWI reference site under Thesis WU: Rubric for assessment. It would be good to use this form also during an informal midterm assessment, such that your supervisor can help you improving your performance during the course of your thesis study.

In the end we will use another form to calculate your mark. This form can be found at the same website, under WU Thesis: assessment form.

5.3 Mark

Below, the significance of a final mark for your thesis work is given.

<table>
<thead>
<tr>
<th>Mark</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 or lower</td>
<td>Major requirements are not met.</td>
</tr>
<tr>
<td>6</td>
<td>(Almost) all requirements are met.</td>
</tr>
<tr>
<td>7</td>
<td>Student has performed well, and has delivered a well edited report. The student's performance and products are in line with what can be expected of an average MSc student.</td>
</tr>
<tr>
<td>8</td>
<td>Above average. Good work, executed independently. His/her work can result in a publication without replication of the experiments.</td>
</tr>
<tr>
<td>9</td>
<td>Highly original. An extraordinary achievement. Major input came from student. Parts of the report can be used to write a publication.</td>
</tr>
<tr>
<td>10</td>
<td>Excellent. Same as 9, plus high quality scientific input from student. Only in exceptional cases.</td>
</tr>
</tbody>
</table>
Appendix 1: Handling Literature References

Reading literature is the beginning of any research. It should be done during the next phases, too. Your supervisor will provide you with the first scientific articles. After that, you will have to search for yourself. You are strongly advised to create your own literature database in Endnote (a software package to handle literature references).

Make use of the library Help information and online instruction/demonstration courses (e.g. for EndNote).

Literature search and building your own EndNote database
The best way to search for and collect references of scientific papers is to use digital library databases. Find these via the library web site (http://library.wur.nl/desktop/). If you are outside Wageningen first login as Wageningen UR User at the top left of the screen, using your regular username and password. Select under Most used resources Scopus.

- Start searching with specific keywords. If you wish to add fields and use Boolean operators then click on ‘Add search field’
- Tick the references that you wish to add to your Endnote library
- Click Export
- Click your preferences. Export format: RIS format; Output: Abstract format
- Make sure the Endnote library (your personal literature database) in which you want to download the references is opened.
- Click export and open scopus.ris. Ready!

Overview of abstracts in printable document
To print the text of the abstracts that are present in your EndNote database you can open a Word document. Highlight the requested references in EndNote. Switch to Word and insert the references (see below). Finally, choose - Format Bibliography – select ‘annotated’ as output style and select OK.

Insert references in a Word document
In Word you can include references automatically. You have to have your Endnote library opened. Highlight the record you want to refer to. In Word, Under the Endnote X5 tab:

- Click on the Insert Citation button
- Insert Selected Citation(s)

That’s all!
Do not put the references between brackets. EndNote will do this automatically when needed.

Create a list of references and format the refs throughout the text
After having finished your Word document you can create your list of references. This will also format the references throughout the text.
Under EndNote X5 tab:

- Make sure that under Style “Soil Science Society of America J.” is selected.
• Click “Update Citations and Bibliography”
After having revised your document you can update the list of references by repeating the final procedure.

Adjust or fine-tune the format of references in the text
If you need references like e.g. ‘Brown (2007) found .....’ first format the bibliography in Word. Then select this reference in your Word document and click the right mouse button. Select Edit Citation and tick your preference.
Appendix 2: The Research Proposal

Thesis work can generally be divided into three phases: the preparation phase, the execution phase and the reporting phase. The first and last phase take about 25% of the total time available each, the execution takes about half of the time. The Research proposal forms the completion of the preparation phase.

The Research proposal has the following sections:

**Title** should be brief (maximally 12 words), positive and specific. Does not need to equal the title of the final thesis.

**Your name**

**Problem description:** What scientific/societal problem will be addressed? Includes motivation and relevance for science. Relevance for society can also be included.

**History:** What is known already?

**Aims, research question, hypothesis:** What is not known yet, and what will be addressed in the thesis study? What is the aim of the thesis study. Definition is an important part of this section. What are you (not) going to do?

**Approach, Methods** What kind of experiments, how many experiments will you do, which treatments, how many replicates? How long will experiments last? Where will they be done? What kind of analyses, what methods?

**Planning,** preferably including a Gantt chart, correct to the level of weeks. Does everybody (including technicians, laboratory) agree?

**Cooperation:** With whom will be cooperated? Who needs to do what, and when? Is everybody aware of your expectations and his/her responsibilities?

**Budget:** Ask your supervisor for instructions and help.

**References:** Add relevant literature references. See instructions in Appendices 1 and 3.

Use the Style guidelines in Appendix 3.

The level of detail of the research proposal should be discussed with your supervisor. Usually, a major part of the proposal can be used for the Introduction and Materials & Methods of your final thesis.
Appendix 3: How to Write a Thesis?

Sections:

Cover with title and your name. Title should be brief (maximally 12 words), positive and specific. Can be a summary of the text, a conclusion, question, short description of the subject,.... Preferably begins with a relevant keyword and accurately describes the thesis contents. Avoid dull titles like “The effect of...”, “Some aspects of.....”

Title page With title, your name, “MSc thesis Soil Chemistry and Chemical Soil Quality or MSc thesis Soil Biology and Biological Soil Quality, Wageningen University”, name of your supervisor and examiner, month and year in which you finished the thesis and code (SOQ-813** or SOQ-818**).

Abstract Maximally 250 words, summarising each of the other sections. It should tell why and how the study was made, what the results were and why they are important. Start with a clear statement of the objective, the approach, and main results. End with one or two sentences that emphasise important conclusions. Use the past tense.

Preface (not necessary) The personal touch to the thesis. For instance: Why were you interested in the topic, whom did you cooperate with, ....

Introduction Demonstrates that the story being told is worth telling, makes the reader enthusiastic. Gives a description of the problem that is dealt with in the thesis. Usually gives a historical, brief summary of the relevant literature about what has been and has NOT been done before. This is followed by the objectives of the study. Specify the research question to be answered or the hypothesis to be tested.

Do NOT repeat BSc study material. Expect your reader to be well informed about everything you (are supposed to) have learned during your pre-MSc training.

Usually the Introduction has this kind of structure:

• Context, what do we know?
• What is it that we don't know? What is the gap in the knowledge?
• Why do we need to know? Why is it important?
• Objectives/hypotheses of the study

Materials and Methods How did you do it? Give as many details as needed, but not more, so that the research can be repeated by a knowledgeable colleague. Use the past tense.

Results Presents all of your findings clearly, logically and concisely. Try to write it in such a way, that reading of Materials and Methods is not necessary to understand what has been done. Use graphs and tables (see below), but make sure the text is readable without having a look at them. The most relevant results that appear in a table or figure should also be described in the text, referring (between brackets) to the relevant Table/figure. Use the text to guide the reader and to highlight and reinforce those data from tables and figures that will be important in the Discussion.

Results obtained by you but not relevant should be put in the Appendix. Do NOT interpret data or draw major conclusions. Use the past tense. Avoid sentences like “Figure 3 shows the free metal concentrations in soils with different pH's”. This repeats the figure legend. Write instead: “The free metal concentration was higher in soils with a lower pH (Figure 3)”. This represents the message of the figure and triggers the reader to have a careful look at the figure.
**Discussion** Feeds back on your research question or hypothesis. Generalises and interprets results. What do your results mean? Refer to Figures and Tables in the Results section whenever applicable. What did we learn from your results? How do they compare to what was previously published (references)? What are the answers to the research questions presented in the Introduction? What do we NOT know yet, and should be addressed in future research? Use literature references to support your arguments.

Usually the Discussion has this kind of structure:

- Reiteration of the main findings in view of the research questions. What are the main findings, what new information did you find? What can you conclude about your hypotheses/research questions?
- What is the novelty of these findings, and how they extend the frontier of knowledge, as compared to what other people have already found. What do we understand now that we did not understand before?
- Finally, you can state something on the practical implications of the findings.

**Acknowledgements** (Not necessary.)

**References** Copy the style from Soil Science Society of America Journal. See Appendix 1 for instructions on how to use Endnote for automatically formatting your citations and list of references.

**Appendix** Contains less relevant data, or objects too large for the main text. Consult your supervisor. You may put all the original data in here, preferably in Tables with self-explanatory headings.

**Tables and Figures**

There is no general rule telling you if results should be presented in a figure or table. Figures should focus on relationships among numbers. Figures are usually easier to read, but less precise. Use figures to show qualitative features and trends. If you have too many treatments or data to compare, then a table can be more appropriate. Also, a table is necessary if the reader should be able to evaluate the exact numbers.

- **Figures**: Each separate figure should be understood independently. It should have its own, self-explanatory legend, below the graph or picture. It should be possible to read and get the message from the figure without reading the rest of the report. In cases of graphs: all axes should have titles, with SI units in brackets. Use error bars whenever means of replicates are given, and mention the number of replicates in the legend.

- **Tables**: Each separate table should have its own, self-explanatory heading, above the table. It should be possible to read and get the message from the table without reading the rest of the report. Row and column headings should be complete including SI units. If all the units are the same for all numbers, they can be given in the heading. Do NOT use vertical lines. Avoid using more than three digits to present data because the error is usually in the range of 2-5%. In case of replicates: give either standard error in brackets, or give means that do not differ significantly the same letter. Mention the number of replicates in the heading, and the statistical methods used (if applicable).
Style guidelines

- Use short and simple sentences. Present only one idea per sentence. Begin a sentence with the most important idea, the subject.
- Separate paragraphs by a white line.
- Discuss only one subject per paragraph. Start each paragraph with its message, the most important or topic sentence (‘mini-summary’). This makes reading more easy and effective and attracts attention. Round off each paragraph with a final sentence emphasizing its key point.
- Start the Discussion section with the most important paragraph and end with the least important one.
- Both the accepted common name and the chemical name of a compound must be given when first mentioned in the text and abstract. For plants, the Latin binomial and authority (e.g. *Brassica napus* L.) must be shown at first listing in the abstract and main text. Later abbreviations (e.g. *B. napus*) or synonyms (e.g. rape) can be used. All Latin names should be in *italics*.
- SI units must be used throughout (see, for instance, page iv and v of an issue of Soil Sci. Soc. Am. J. for conversions).
- Abbreviations: provide an alphabetical list of abbreviations if necessary. Do NOT include SI units or chemical element symbols. When necessary, provide a glossary.
- Spelling: apply the Spelling and Grammar check (Tools) in Word. Consequently use either UK or USA English as language.
- Grammar: use present tense for common knowledge, so for the major part of the Introduction and Discussion (‘Plant roots modify the rhizosphere.’). Use past tense for the major part of Materials & Methods and Results (‘Rhizosphere pH was measured.’)

Size

Make the report as short as possible! Remember a scientific publication of several pages only, usually describes work that took over a year. If a general relationship between size and quality would exist at all, it would be: The shorter, the better!

Formats

Font: Verdana, font size 8.5
Line spacing: single at 1.15.
Margins: 2.5 cm on all sides.
Make double-printed copies whenever possible to save paper.
Make a pdf file of your document.

Further reading

Lamers HAJM 1993 *Hoe schrijf ik een wetenschappelijke tekst?* Coutinho, Bussum.

Tip: Effective Use of Grammar and Style in Scientific Writing
San Francisco Edit  http://www.sfedit.net/newsletters.htm.
Appendix 4: How to Give a Seminar?

As with any other aspect of your thesis work, you can ask your supervisor for advise in preparing your seminar. You may want to ask him/her to attend a rehearsal and comment.

Preparation
Whenever you start preparing a presentation it is good to ask yourself some preliminary questions:

- What do I want to achieve with my presentation? What are my objectives?
- What kind of audience will I have?
- What do I consider most important about my topic? What are my priorities?
- What is my ‘take-home message’?
- How much time do I have for my talk?

The set-up of your seminar
- The starting point for any oral presentation is a clear set-up, like: Introduction – Research Question or Hypothesis or Aim – Materials & Methods – Results – Discussion – Conclusions - Summary. Any other set-up is OK, as long as the research question/aim of your work and conclusions are explicitly put forward.
- It is absolutely necessary to present your research question/hypothesis/aim in keywords (!) on a slide.
- Summarize the bottom line at the end, coming back to the research question/hypothesis/aim presented in the introduction. End with the ‘take-home-message’.
- The structure of your talk should be:
  - Tell the audience what you are GOING to tell them
  - TELL them
  - Tell the audience what you TOLD them
- Make sure your presentation does not last longer than 30 minutes. Therefore you have to practise (aloud!) before. If your rehearsal lasts too long, cut out information. You don’t have to present everything you did!

The use of slides
You need to use slides in order to make sure that the audience can follow your line of reasoning. Take care of the following:

- Download and use the Wageningen University home style (WU-huisstijl) Powerpoint template from Intranet (search for “huisstijl”) or contact your supervisor on what template to use.
- Slides are only useful if the audience can read them. Check this in advance in the back of the room you will use. Use large letters, without serif (schreef) (for instance: Verdana, News Gothic or Arial, preferable font size 24. Minimal font size: 20). Never use upper case only. Use italics for emphasis.
- Don’t use too many slides. Estimate on average at least one minute per slide (circa 2 minutes is probably more realistic). So 30 slides is the maximum.
• Forget about an introducing slide telling that you start with an Introduction, will then proceed with Material & Methods, Results, and end with Conclusions. This is standard, so a waste of time to explain. Instead use a slide preparing the audience for your message.

• Don't put too much information on one slide. Only show relevant information. Tables are to be avoided, but if necessary reduce large tables to maximally 10 numbers and 2 or 3 rows and columns. Don't add table headings, explain orally. Figures and Tables from your thesis generally have to be edited before making them suitable for an oral presentation. Use colours in your graphs.

• Only use keywords, not sentences. Make sure the audience is listening and not reading.

• Try to vary. Vary tables, text, equations, figures, animations, etc.

Make sure the slides support your talk, and not the other way around.

Your presentation

• Speak up loudly, not monotonously, show your enthusiasm. Use short sentences.

• Make sure everybody can read your slides, don't stand in front of them.

• Never turn your back to the audience, address them directly, and keep eye contact. Don't talk to the screen.

• Do not stay put in the same position all the time. Move around. Don't put your hands in your trousers-pocket, but use them instead to emphasise what you are saying.

• Rehearse at least twice aloud before, so that you don't need to think about how to formulate sentences during the presentation. This prevents “eh”s, and is necessary to make sure you don't exceed 30 minutes.

• Take care everything is functioning by the time your presentation is supposed to start. So be there well in advance.

Nerves

It is absolutely normal to be nervous. You even have to be nervous for a good performance! Do realise that also experienced speakers are nervous. Try to appreciate the state of being nervous as a state of being ready: sharp and focussed.

It is absolutely NOT necessary to be extremely nervous. YOU are the expert on the topic presented. The audience is there because of interest in your topic, not to tackle you. You are to create the right atmosphere: a well-prepared presentation shows your respect for the audience and creates the positive, lively atmosphere needed for a fruitful discussion of your results. In contrast, a sloppy, disorderly, indistinct presentation that lasts too long mainly causes irritation. So if everything is well-organised, nothing can go wrong!

Feedback

It is good practice for students to give mutual feedback after the seminars. Usually one student is asked feedback in terms of “I wish…..” (with hints for improvement) and “I like…..” (with things that worked out well). The form on the next page is maybe helpful in giving mutual feedback.
**Further reading**
**Oral Presentation appreciation form**

**Presentation by:** ……………………….  
**Appreciation from:** ………………………………..

<table>
<thead>
<tr>
<th></th>
<th>Appreciation</th>
<th>Remarks / Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTRO</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention of the audience was drawn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aim of presentation was explicitly mentioned</td>
<td></td>
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</tbody>
</table>

| **STRUCTURE** |              |                       |
| The structure supported the aim of the presentation |              |                       |
| The structure was clear and transparent |              |                       |

| **CONTENT** |              |                       |
| The content was in accordance with the knowledge level of the audience |              |                       |
| The content matched the aim of presentation |              |                       |

| **CONCLUSION** |              |                       |
| The conclusions related to the aim and raised issues |              |                       |
| The conclusions were a logical endpoint, 'take-home-message' |              |                       |

| **DISCUSSION** |              |                       |
| Active interaction (statements presented, challenging audience to question, etc.) |              |                       |
| Structured |              |                       |
| Quality of answers (repeating question, to the point, correct, polite) |              |                       |

| **MEDIA** |              |                       |
| Slides supported spoken words (drawing attention to essentials) |              |                       |
| Slides were clear and readable (e.g. amount of lines and words, font, colour) |              |                       |
| Information on slides varied in appropriate way (text, tables, graphs, pictures) |              |                       |

| **NON VERBAL BEHAVIOUR** |              |                       |
| Eye-contact with audience |              |                       |
| Body language open and active (e.g. supportive gestures) |              |                       |
| Use of voice (lively, using intonation, speed, volume and clear articulation) |              |                       |
| Enthusiastic |              |                       |

| **GENERAL** |              |                       |
| Duration of presentation well planned and controlled |              |                       |
| Level of English |              |                       |