



UNIVERSITY OF AMSTERDAM
Faculty of Science

Graduate School of Life and Earth Sciences

Protocol (course manual) Research Project

Master Biological Sciences

Master Biomedical Sciences

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Overview of the process

Summary protocol Research Project MSc Biological Sciences and Biomedical Sciences		Student	Assessor	Daily supervisor	Examiner
			Staff member at UvA or elsewhere. Responsible for the student's project. Supervises about 2 hr per week. Can be daily supervisor.	Supervises about 1 hr per day. At least with MSc degree.	UvA staff member. Cannot be assessor.
Proposal	Student prepares proposal, starting up to 6 months before start date, consults envisaged assessor and daily supervisor, and selects examiner. Proposal is submitted in DataNose; track coordinator must approve.	●	○	○	○
Start date					
↑	Kick-off	At start the student sets up a meeting (on-line if needed) with examiner, assessor and daily supervisor	●	●	●
Five (30 EC) to ten months (60 EC)	Interim assessment	Eight to ten weeks after start date, to discuss progress (no grading). Assessor puts results in DataNose.	●	●	
	Presentation	Student presents and uploads file in DataNose. Assessor and daily supervisor attend. Assessor gives marks within one day.	●	●	
	Final round feed back	Full draft report emailed to daily supervisor and assessor three weeks before end date.	●	●	
	Upload final report	Final report uploaded in DataNose. No more changes allowed after upload. Upload after end date remains possible.	●		
	↓				
End date					
	Check for plagiarism	After upload final report; if plagiarism is detected, the examiner informs Examinations Board. Done in 20 working days after upload final report.			●
	Final assessment	Assessor marks research, presentation and report (with advise from daily supervisor). Examiner marks report, establishes final grade and explains grade to student.	●	○	●

1. RESEARCH PROJECT

The research project is a compulsory part of the MSc in Biological Sciences and the MSc Biomedical Sciences. Research projects give students the opportunity to acquire practical experience by empirical scientific research methods and to learn to work independently in a research laboratory. Students design and carry out their own projects, under supervision of and with feedback by research staff. A research project is carried out full-time, and its subject must be different from that of any other research project or the literature review. Usually, practical work such as laboratory experiments, field work or computer simulations, make up the larger part of a research project. The research project should be completed with a written report and an oral presentation, both in English. During the presentation the student presents, defends and discusses the scientific results of the project publicly in front of students and staff of the institute(s) involved.

Unless students do a major, two research projects must be done, each with a minimum of 30 EC and maximum of 60 EC. The scheduled amount of credits for the research projects differs per track and per research project. Please check the Teaching and Examination Regulations (OER) at www.student.uva.nl, for [BS](#) or [BMS](#).

The first research project should preferably take place within one of the research institutes of the Faculty of Science, or in one of the institutes which contribute to or are affiliated with the MSc programme. The second research project could be carried out at an external institute (other university, research institute, company, etc.) in or outside the Netherlands.

First and second research project must comprise different research subjects. These subjects must differ from the subject of the literature review by the student.

2. OBJECTIVE AND INTENDED LEARNING OUTCOMES

The objective of a research project is to give individual students the opportunity to acquire practical experience by empirical scientific research methods and to learn to work independently in a research laboratory or during field work. The research project provides students with a research-based learning experience through carrying out research independently under supervision of established scientists during a prolonged period of time. The student further learns about the possibilities on the job market after graduation, and has the opportunity to discover gaps in his knowledge or skills and fill these.

After having completed a Research Project the student is able to

- formulate a clear research question, and develop and validate a hypothesis
- design and plan a set of experiments, in vivo, in vitro, in situ or in silico, including the methods to collect the necessary information
- collect quantitative information to conduct these experiments, by measurements in laboratory or field, or by data extraction from reliable sources
- process and analyze (statistically sound) the information gathered and perform a critical evaluation and interpretation of these outcomes
- critically judge and reflect how the results from the conducted experiments contribute to new insights, compared to existing information in the literature
- present and discuss in English the research findings during colloquia and scientific meetings (i.e. to peer scientists)
- write a scientific report in English about the conducted research

On the basis of the learning experience obtained after the first research project, students are expected to carry out their second research project more independently, more efficiently, and addressing issues of greater complexity than their first research project. It means that after having successfully finished two research projects, students will have reached higher levels of knowledge and understanding and better developed attitude and skills to carry out a research project independently, compared to students that only finished one research project.

3. ASSESSOR, DAILY SUPERVISOR AND EXAMINER

A research project has two or three persons involved in the supervision and assessment, as follows:

The *assessor* is a permanent staff member at the faculty, research institute or company where the student carries out his/her research project. The assessor is responsible for the research project of the student and often leads the research into which the research project of the student is embedded. The assessor is available regularly (usually a couple of hours per week) at all stages of the research project to provide support and feed back to the student. The assessor carries out the interim assessment and the final assessment, in consultation with the daily supervisor. Assessor and examiner must be two different persons, but an assessor can act as daily supervisor.

The *daily supervisor* is a PhD student, postdoctoral fellow or permanent staff member at the Faculty of Science, or a researcher at an institute or company where the research project is performed. This person has at least a MSc degree. During the research project the daily supervisor is available for the student for feed-back and support on a daily basis (on average an hour per day) and in formal or informal meetings, regarding all aspects of the research, including the setting out of the time plan at the beginning of the project, the teaching of all necessary techniques, the set-up of experiments, the interpretation of results, and the drawing of conclusions. If temporarily unavailable for supervision, the daily supervisor ensures that a colleague is available to respond to urgent issues raised by the student.

The *examiner* is appointed as examiner by the Examinations Board of the master programme at the Faculty of Science (FNWI). This FNWI-appointed examiner assesses the final report and submits the final grade in DataNose to the Education Desk of the FNWI. Examiner and assessor must be two different persons.

Important: Teaching staff involved in a particular role (daily supervisor, assessor or examiner) in a first research project cannot have any teaching role in a second research project of a student. Furthermore, teaching staff acting as daily supervisor or assessor in a research project cannot have any of these roles in a literature review of the student. Vice versa, teaching staff involved as examiner in a research project cannot act as examiner in a literature review of the student.

4. PREPARING AND SUBMITTING THE PROPOSAL

For research projects in the Netherlands, a student generally starts the preparation *at least 4 weeks* before the envisaged start date. During this preparation time, the student

- prepares a description of a proposed research project, in consultation with the intended assessor and daily supervisor. Examples of Research project proposals can be found on the Canvas page of the MSc programme (MSc Biological Sciences).
- asks a permanent staff member of the Faculty of Science (FNWI) if he/she is willing to act as examiner of the research project.

For research projects abroad with an external assessor, the student starts his/her preparation *at least six months* before the start date. This long time is needed to look for funding, apply for visas, etc. (see Guidelines for research projects abroad at the Canvas website of the master programme). Important for research projects abroad is also that the student

- asks the track coordinator if the intended assessor abroad can be accepted
- carefully studies the documents about travel advice by the Ministry of Foreign Affairs at the Canvas website of the master programme, and talks about safety issues with the track coordinator
- prepares a description of a proposed research project, in consultation with the intended assessor and the daily supervisor
- asks a permanent staff member of the Faculty of Science (FNWI), or an appointed examiner of one of the affiliated institutes, if he/she is willing to act as examiner of the research project

After both assessor and examiner have agreed upon their role in the intended project, the student submits the project proposal in DataNose, using the on-line project form:

<https://datanose.nl/#project>. Using this form the student can choose the examiner from a list that appears in a pop-up.

Research proposals submitted in DataNose generally contain at least 500 words (excluding references) and should include the following items:

- Working Title
- Research background
- Research questions (often including hypothesis, (sub)questions); ^[11]_[SEP]
- Techniques: which techniques will be used and which of these are new for the student
- Literature, preferably including output of the group where the research will take place
- Start date: projects cannot start before the Track coordinator has approved, so this must be considered when proposing a start date
- End date: the time lapse between start and end date must correspond to the time spent on the project (which corresponds to the amount of EC), plus the time needed for holidays and other interruptions. For example: a 30 EC project always corresponds to five months of project activities. Without holidays or interruptions, the time laps between start and end date is five months. If a holiday period of one month is planned after the start but before the end date, the project remains a 30 EC project but the time lapse between start and end date becomes six months.

Important 1: It is especially recommended that sufficient time is planned for report writing. The track coordinator can give useful advice!

Important 2: If a research project contains *field work*, the student should carefully study the field work file on the Canvas page of the MSc Biological Sciences, which contains information about medical forms, field work statements and insurance issues, amongst others.

5. APPROVAL BY THE TRACK COORDINATOR

The track coordinator examines the proposal as submitted in DataNose. After approval by the track coordinator, the examiner receives a formal request to confirm his role in the project. If all parties agree, this will be notified to the student by email with CC to the track coordinator, assessor and examiner. If the track coordinator does not approve the proposal, or if the examiner refuses to act as such in the project, he/she briefly explains the reason for the denial, which will be sent to the student. In such situations, the student can resubmit a revised proposal in DataNose.

Important: The student is not allowed to start a research project without prior approval by the track coordinator. Any research activities by the student carried out in projects that are not approved, do not yield EC credits and are not covered by UvA insurance.

In case of research projects abroad, the track coordinator assesses the feasibility and safety of the proposed research abroad, if needed in consultation with the involved research staff and programme director. Permission for a formal study component abroad must be issued on the basis of a travel advice given by the Ministry of Foreign Affairs of the Netherlands (www.nederlandwereldwijd.nl/reizen/reisadviezen). If a travel advice becomes negative between the approval of the research proposal and the actual departure of the student, the initial approval is withdrawn immediately, and a new assessment of the feasibility and safety of the proposed research abroad must be made by the track coordinator, if needed in consultation with the involved research staff.

Important 2: In case of research projects abroad, if a travel advice by the Ministry of Foreign Affairs of the Netherlands (in Dutch) (see: <https://www.nederlandwereldwijd.nl/reizen/reisadviezen>) becomes negative after the student has started his/her activities outside the Netherlands, students are expected to follow advice from the Dutch embassy (or from their own country if they do not have Dutch nationality) in the country or area where they sojourn.

6. TIME LINE RESEARCH PROJECT

After the project proposal has been approved by the track coordinator, the student starts with the research at the start date. The first activity of the student is to organize a kick-off meeting so that all parties involved (student, examiner, assessor and daily supervisor) communicate about the proposed research, the role of everyone involved, this protocol and the assessment (interim plus final). Eight to ten weeks after the start date, the student or assessor initiate an interim assessment (see section 9). Two weeks before the end date the student emails (*not* through DataNose) a complete draft of the final report to the supervisor and assessor for a single round of feedback. Before the end date, the student uploads the final report in DataNose and automatically receives a link to the evaluation form. After the upload of the final report, the examiner checks the report for plagiarism by using Ouriginal, and assessor and examiner start their final assessment. Before the end date, usually in the weeks just before the upload of the final report, the student gives his/her oral scientific presentation at the institute where the research has taken place. It is the responsibility of the student to set a time and day for this presentation. In case of external research projects (at non-UvA institutes) the student is encouraged to repeat his/her presentation at the Faculty of Science.

Important 1: After the upload of the final report in DataNose, no changes are allowed anymore. If the report is not ready before the end date, it is possible to do the uploading after the end date.

Important 2: If the student encounters any serious delay (two weeks or more) because of personal circumstances or force majeure, this should be e-mailed immediately and anyhow before the end date to the study adviser (personal circumstances) or examiner (force majeure). See section 13.

Kick-off meeting	Student, examiner, assessor and daily supervisor	At start of project
Interim assessment (formative, no grade)	Student, assessor and daily supervisor	Eight to ten weeks after start date
Full draft of final report emailed to daily supervisor and assessor for final feed-back	Student	Three weeks before the end date
Processing feedback, finalizing final report	Student	In the three weeks before the end date
Oral presentation and upload of presentation file in DataNose	Student	Before the end date
Assessment of oral presentation	Assessor	Within one day after the presentation was given
Upload final report in DataNose	Student	Before end date
Evaluation by the student	Student	Directly after having received the link to the form
Check of plagiarism of final report using Ouriginal	Examiner	Before final assessment
Assessment of research and final report	Assessor (with advice from daily supervisor) and examiner	Max. 20 working days after upload of final report
Establishing final grade in DataNose	Examiner	After all subgrades have become available or anyhow three months after the end date

7. CONFIDENTIALITY ISSUES

In some situations, the research institute (of the UvA or an external institute) or the assessor may request the student or staff involved in a research project to treat the outcomes of a research project as confidential information. This request can be done orally or by asking to sign a non-disclosure agreement. Non-disclosure agreements are sometimes included in internship contracts offered by external institutes.

Non-disclosure agreements should not hamper in any possible way the student's learning process during a research project. This implies, that during the research project and anyhow before the final assessment (see next section), the student should always be allowed to show all outcomes of his/her research project during discussion meetings or oral presentations to fellow students and research staff of the research group where the research project is being carried out or to staff involved in the assessment and examination. Also, the final report of the research project must always be available for inspection by accreditation committees of the master programme.

FNWI appointed examiners must treat all reports they receive for assessment confidentially and are not allowed to make any content public or discuss content with other parties.

Important 1: Therefore, in case a student is requested to sign a non-disclosure agreement or an internship contract that includes such an agreement, he/she should always consult the track-coordinator if the clauses mentioned above are properly included in the agreement. Signed agreements or contracts should be sent to the track coordinator or programme coordinator to be uploaded on the project page in DataNose.

Important 2: If the student discloses confidential outcomes of the research project after having signed a non-disclosure agreement or after even being notified by the assessor that the outcomes of the research project must be treated as confidential, the student may be liable for any inflicted damage.

Near the end date of the project, the student uploads the final report in DataNose. This uploading implies that the report becomes available to all staff members involved in the assessment and examination, and to all members from accreditation committees, who must evaluate the outcomes of student research projects by law. By default, final reports uploaded into DataNose are not available to any other persons. On request by the assessor, the programme coordinator can make the final report freely available to all.

8. INTERIM ASSESSMENT

The interim assessment of the research project takes place eight to ten weeks after the start date of the project. For this, the student, supervisor and assessor meet to evaluate the student's research project, on the basis of the criteria of the rubric for the Interim Assessment (Appendix B), as implemented in DataNose. The meeting is initiated by the student or assessor. It yields a good opportunity to talk about how the feedback, supervision, and contact between student and staff has developed during the initial phase (the first months) of the project. The interim assessment is formative, which implies that there is no grade registered. It should help the student to evaluate his/her learning progress, to familiarize with assessment criteria, and to improve the quality of the research project. Serious problems should be mentioned on the interim assessment form, and might also be passed on (by student or assessor) to the examiner and track coordinator.

9. REPORT WRITING

Guidelines for the report of the Research project are as follows (see also the assessment criteria in section 12 and Appendix C, and examples of final reports in <http://scripties.uba.uva.nl>):

- The report should be an account of all research (sub)questions and hypothesis addressed in the context of relevant theory;
- The report should address all methods and techniques used;
- The report contains a discussion of all results.
- The report should contain and describe only the research performed by the student. If it is needed to include outcomes of research by others, this should be well justified and those outcomes should be well recognizable.
- The report contains the following sections: ^[1]~~SEP~~ Abstract - Introduction - Materials and Methods - Results - Discussion - References - Acknowledgements - Appendices
- The report contains between 12,000 to 18,000 words, excluding the literature list.
- The report is written in English.
- The lay-out of the title page (page 3 of the report) is according to appendix A of this protocol.

10. PLAGIARISM AND FRAUD

Regarding fraud and plagiarism, this protocol strictly follows the UvA regulations. Using Ouriginal, as implemented in DataNose, and following guidelines explained in [Teaching Matters in DataNose](#), the examiner studies the final report to look for any reason to suspect plagiarism or fraud committed by the student. If there is any suspicion, the examiner first shares his/her thoughts with the student and assessor. If the suspicion persists, the examiner hands over the assessment to Examinations Board, indicating the reasons to suspect plagiarism or fraud together with the student's points of view. From that moment on, the Examinations Board instructs how to proceed with the assessment process. This implies that the examiner should *not* register any final grade if he/she has any suspicion of committed fraud or plagiarism.

Important: The examiner should inform the student about the involvement of the Examinations Board because of suspected fraud or plagiarism, but should *never* accuse the student of fraud or plagiarism. Only the Examinations Board can conclude that the student has committed plagiarism or fraud.

11. FINAL ASSESSMENT

The final assessment involves three parts (Research, Report, and Oral presentation) and is implemented in DataNose. The assessor assesses the presentation directly after it was given by the student. The assessor further assesses the research and report within 20 working days after the upload of the final report. The examiner only assesses the report and does this independently from the assessor, again within 20 working days after the upload of the final report. The results of the assessments are made visible to the student.

All assessments are based on a rubric (Appendix C) and involves entering marks on a scale from 1 to 10 for the student's achievements regarding the following criteria:

For research, which involves experimental work, field work, information analysis, programming or modelling:

- Theoretical knowledge: Did the student master the theory related to the research topic?
- Induction-Deduction: Did the student understand the deductive or inductive reasoning processes involved in the formulation of the problem, research questions or hypotheses?
- Methods and results: Were methods appropriate? Did the student understand methods and results?
- Critical appraisal, integration and creation: Did the student show ability to critically evaluate the results and integrate these in current thinking to develop new insights?
- Originality: Did the student convincingly express and defend his/her own ideas to improve the research?
- Responsiveness and cooperation: Did the student actively participate in work discussions and communicate well with supervisor and other group members to allow fruitful feedback?
- Technical performance: How did the student execute lab work or fieldwork, information analysis, programming or modelling?
- Safety and environment: Was the research (lab work, fieldwork) carried out safely and with respect for environmental issues?
- Independence and initiative: Did the student perform or and/or initiate high-quality research activities independent from the supervisor?
- Efficiency: Did the student complete the research within the time period scheduled?

For report, which involves the written report:

- Title/Abstract: Did the abstract contain a full but concise summary of the research? Was the title informative?
- Introduction/context: Was the subject introduced in a correct scientific context? If applicable, was the relevance for society well recognized?
- Methods: Were the methods described in such a way that the study could be repeated and that the results could be understood properly? Was a justification given for the choice of methods?
- Results: Was the description of the results complete and did they address the research questions/hypotheses? Were interpretations well separated from observations? Are the results ready for publication, if desired?
- Discussion/conclusion: Were the results discussed critically in view of the research question? Did the student draw sound conclusions?
- Use of literature: Was the quality and quantity of the literature sufficient? Was the literature cited adequately and correctly presented in a list of references?
- Structure: Was the report clearly written and well-structured?
- Lay-out and language: Did pictures, figures, graphs and tables support the text? Did the overall lay-out improve the readability? Was the use of the language basically correct as to grammar and spelling?
- Independence and initiative: How much feedback and support were needed for the report writing, and was the feedback properly addressed??
- Efficiency: Did the student complete the final report within the time period scheduled?

For presentation, which^[1]_{SEP} involves the oral scientific presentation:

- Contents: Did the presentation give an accurate description of the work, including the research question? Has the contribution of the student been indicated explicitly?
- Structure of the presentation: Was the presentation good to follow? Was the information conveyed in a clear, and logically sound sequence, with appropriate timing?
- Clarity of presentation: Did the student correctly and effectively use slides, animations, movies, etc.?
- Contact with audience: Did the student communicate effectively with the audience? Did he/she initiate involvement of the audience?

12. FINAL GRADE

The final grade is calculated as follows:

- For the assessor, subgrades for research, report and oral presentation are calculated as the weighted average of the marks entered in DataNose, with weights for each mark as indicated in the rubric (Appendix C).
- For the examiner, the subgrade for report is calculated as the weighted average of the marks entered in DataNose, with weights for each mark as indicated in the rubric (Appendix C).
- The final grade is the weighted average of the subgrades for research, report and presentation, with fixed weights of 60%, 30% and 10% for research, report and presentation, respectively. In this calculation, the subgrade for report is calculated as the mean of the subgrades issued by assessor and examiner.

If the examiner and assessor differ strongly in their assessment, the examiner may contact the assessor in order to discuss the marks and reach more consent. In such cases, the examiner can reset the grading procedure so that both assessor and examiner are able to adjust their marks.

Important 1: In case a student fails to upload the final report in DataNose within three months or more after the end date of the project, and if this failure cannot be explained by personal circumstances (illness, etc.) or force majeure, the examiner is entitled to assess the project with a final grade of NAV (Dutch: Niet Aan Verplichtingen Voldaan, i.e. obligations not met).

Only if the final grade is sufficient for a pass, the examiner makes sure to register the final grade in DataNose. In case the final grade is higher than 8.0, the examiner adds a brief motivation for this grade on the project page in DataNose.

Students do not pass if

- the final grade is NAV or lower than 5.5
- any of the subgrades for Research, Report or Presentation are lower than 5.0

If the subgrade for the Research component of the project is 5.0 or higher, but the student cannot pass because of low subgrades for Report or Presentation, the examiner and assessor consider granting the student a limited amount of time (generally not more than one month) to improve the final report or presentation. If the student accepts, the examiner contacts the programme coordinator to make sure that the improved version of the final report or presentation can be uploaded in DataNose.

Important 2: If it turns out that the student does not pass, not even after having submitted improved versions of final report or presentation, the examiner should *never* register the final grade. Instead, if this happens, he/she should indicate the final grade together with a short explanation on the project page in DataNose. Then the examiner should inform the student that the project has come to an end, and that the student should carry out a completely new project.

13. NO SHIFT OF END DATE TOWARDS FUTURE IN CASE OF PROJECT DELAYS

Shifting the end date towards the future in case of any delay is not needed and therefore not possible. The upload of the final report in DataNose can be done after the end date. If a delay has occurred through no-fault of the student, i.e. in case of personal circumstances (illness, etc.) or force majeure, delays have no consequence for the final grade. Such delays should be communicated by e-mail as soon as possible and anyhow before the end date to the study adviser (in case of personal circumstances) or the examiner (force majeure). In consultation with the study adviser, the examiner decides if the delay has occurred through no fault of the student. This decision is appended as a remark onto the project form in DataNose.

14. SHIFTING END DATE TOWARDS FUTURE IN CASE OF NEW RESEARCH

Shifting the end date towards the future is only possible if the research question and the expected outcomes of the research project are expanded beyond those foreseen and mentioned in the proposal. The expansion must entail addressing new questions and new research activities, which are related to but not yet conceived in the original proposal. A shift in the end date therefore always implies an increase in the amount of EC of the research project. Shifting the end date simply because the project, for whatever reason, cannot be finished because of a delay is not allowed. The end date can only be shifted towards the future once, and then only by one or more months corresponding to 6 EC or a multiple thereof. Furthermore, the maximum duration of the project after extension can never exceed the number of months corresponding to 60 EC. To request a shift of end date, the

student first needs permission from assessor and examiner. Then he/she should email the Examinations Board. The Examinations Board only takes this request into consideration if it is accompanied by confirmations in writing separately issued by the assessor and examiner, in which they express their full support for the requested extension.

The request for an extension should contain:

1. The scientific questions studied during the research project.
2. The experimental techniques used during the research project.
3. The scientific questions studied during the extension of the research project.
4. The experimental techniques used during the extension of the research project.

If the Examinations Board approves, the Board changes the end date and EC amount in DataNose.

15. SHORTENING THE RESEARCH PROJECT

Between the start date and end date of a research project, the student can request for a shortening of the duration of the project by a number of months that corresponds to a multiple of 6 EC. A shortening in time of the research project always implies a decrease in the amount of EC of the research project. To request an earlier end date, the student emails to the Examinations Board, explaining the need for the shortening the research project. This request must be accompanied by a separate confirmation in writing by the assessor and examiner in which they express their full support for the requested shortening. A research project can never be shorter than the number of months corresponding to 30 EC. If the Examinations Board approves, the board changes the end date and EC amount in DataNose.

16. PERSISTING PROBLEMS AND FURTHER QUESTIONS

If the student has any problems or conflicts with staff involved in the research project, and if these problems persist after the interim assessment, he/she should contact the track coordinator and the study adviser for mediation. Problems that cannot be solved after this mediation should be reported to the programme director. For any information about issues not mentioned or insufficiently clarified in this protocol, the student or staff may contact the track coordinator, study adviser or programme director.



UNIVERSITEIT VAN AMSTERDAM

MSc Programme name
Track

Research Project

Title of Research Project

Subtitle (if any)

Name Student

UvA ID Student

Month, Year

Number of ECTS credits

Period in which the research project was carried out

Supervisor

Assessor

Examiner

Name, title

Name, title

Name, title

Logo (if any)

Research Institute, Department / Company

APPENDIX B. RUBRIC USED IN INTERIM ASSESSMENT

			Marks from 1 to 10 (1 is very poor, 10 is excellent)				
Research		Indicative marks-->	10	8 or 9	7	5 or 6	1, 2, 3 or 4
Cognition	Theoretical knowledge:	Does the student master the theory related to the research topic?	The student fully masters the theory related to research topic, and shows understanding of related theories in a wider context	The student shows good understanding of theory related to research topic, but does not show understanding of related theories	The student shows moderate understanding of theory related to research topic	Theoretical understanding of the student is barely sufficient	Theoretical understanding of the student is inadequate to meaningfully carry out the research
Cognition	Induction-Deduction:	Does the student understand the deductive or inductive reasoning processes involved in the formulation of the problem, research questions or hypotheses?	The student shows an excellent understanding of all reasoning processes that lead to the formulation of problem, research questions or hypotheses	The student shows a good understanding of all reasoning processes that lead to the formulation of problem, research questions or hypotheses, with only a few minor flaws	Despite some flaws, the student shows sufficient understanding of the reasoning processes leading to the formulation of problem, research questions or hypotheses to meaningfully do the research	The student barely shows sufficient understanding of the reasoning processes that lead to the formulation of the problem, research questions or hypotheses to meaningfully do the research	The student does not understand any reasoning processes leading to the formulation of the problem, research questions or hypotheses
Cognition	Methods and results:	Are methods appropriate? Does the student understand methods and results?	The student applies entirely appropriate research methods, and interprets the results correctly	The student applies appropriate methods and understands the results, with only a few minor mistakes that do not affect the outcome of the research	Methods are not entirely appropriate, and/or the student shows a fair level of understanding of some methods or results, which negatively affects a part of the research	Methods barely allow to produce meaningful results, and/or the student's low level of understanding of methods and results negatively affects a large part of the research	The student essentially misunderstands the methods, and/or the results obtained, which leads to meaningless research
Cognition	Critical appraisal, integration and creation:	Does the student show ability to critically evaluate the results and integrate these in current thinking to develop new insights?	The student shows ability to critically and flawlessly integrate the results in current theory and develop highly meaningful new insights	The student shows ability to critically integrate results in current theory and develop meaningful new insights, with a few minor flaws	The student shows ability to critically integrate results in current theory and to develop new insights, but not without some important flaws	The student shows a poor ability to critically integrate results in current theory or to develop new and meaningful insights	The student fails entirely to critically integrate results with current theory or develop any meaningful new insights
Attitude	Originality:	Does the student convincingly express and defend his/her own ideas to improve the research?	The student strongly improves the research by his/her own and persuasively defended ideas	The student positively influences the research by means of his/her own and convincingly defended ideas	The student expresses his/her ideas to improve the research but without much determination or conviction	The student hardly attempts to influence the research on the basis of his/her own ideas	The student does not attach his/her own values or ideas to the research
Attitude	Responsiveness and cooperation:	Does the student actively participate in work discussions and communicate well with supervisor and other group members to allow fruitful feedback?	The student actively participates in all relevant discussion meetings and communicates well with the supervisor and other group members, allowing frequent and highly fruitful feedback	The student participates in most relevant discussion meetings and communicates well with the supervisor but not with other group members, allowing frequent and fruitful feedback	The student participates in some discussion meetings and occasionally communicates to the supervisor but not to other group members, allowing only occasional feedback	The student participates in a few relevant discussion meetings and rarely communicates to the supervisor alone, allowing only limited opportunities for feedback	The student essentially works highly isolated to such a degree that it substantially harms the research
Execution	Technical performance:	How does the student execute lab work or fieldwork, information analysis, programming or modelling?	The student executes all activities related to lab- or fieldwork, information analysis, programming or modelling with great precision and without flaws	Only some minor flaws are found in the student's research activities related to lab- or fieldwork, information analysis, programming or modelling	Most research activities related to lab- or fieldwork, information analysis, programming or modelling are performed with minor flaws, but a few with major flaws	Most research activities related to lab- or fieldwork, information analysis, programming or modelling are performed with major flaws	Research activities related to lab- or fieldwork, information analysis, programming or modelling are performed so poorly that the research becomes meaningless
Execution	Safety and environment:	Does the student carry out the research (lab work, fieldwork) safely and with respect for environmental issues?	The student employs high and exemplary standards of safety with respect for relevant environmental issues	The research is being done according to the usual recommendations of safety and respect for relevant environmental issues	In some details the research is being carried out unsafely or without respect for the environment	In important aspects the research is being carried out unsafely or without respect for the environment	The research is being carried out unsafely or without respect for the environment
Execution	Independence and initiative:	Does the student perform or and/or initiate high-quality activities independent from the supervisor?	The student initiates and masters all research activities independently from the supervision	The student initiates and masters most research activities independently from the supervision	The student needs supervision to initiate and master some research activities	For most research activities the student needs frequent and repeated guidance by the supervision	The student imitates and merely repeats activities shown by the supervision
Execution	Efficiency:	Does the student work efficiently, so that the research can finished within the time period scheduled?	The student performs so efficiently, that the research can be finished within one months before the end date	The student works efficiently, so that the research can be finished at the end date	Efficiency needs some improvements, and for now it is foreseen that the project will be finished within one month after the end date	Efficiency needs substantial improvements, and for now it is foreseen that the project will be finished within one to three months after the end date	Efficiency is almost lacking, and for now it is foreseen that the project will be not finished within three months after the end date

APPENDIX C. RUBRIC USED IN FINAL ASSESSMENT

			Marks from 1 to 10 (1 is very poor, 10 is excellent)							
Research			Weight RP1	Weight RP2	Marks -->	10	8 or 9	7	5 or 6	1, 2, 3 or 4
Cognition	Theoretical knowledge:	Did the student master the theory related to the research topic?	10,0%	7,5%		The student fully mastered the theory related to research topic, and showed understanding of related theories in a wider context	The student showed good understanding of theory related to research topic, but did not show understanding of related theories	The student showed moderate understanding of theory related to research topic	Theoretical understanding of the student was barely sufficient	Theoretical understanding of the student was inadequate to meaningfully carry out the research
Cognition	Induction-Deduction:	Did the student understand the deductive or inductive reasoning processes involved in the formulation of the problem, research questions or hypotheses?	10,0%	7,5%		The student showed an excellent understanding of all reasoning processes that led to the formulation of problem, research questions or hypotheses	The student showed a good understanding of all reasoning processes that led to the formulation of problem, research questions or hypotheses, with only a few minor flaws	Despite some flaws, the student showed sufficient understanding of the reasoning processes that led to the formulation of problem, research questions or hypotheses to meaningfully do the research	The student barely showed sufficient understanding of the reasoning processes that led to the formulation of the problem, research questions or hypotheses, to meaningfully do the research	The student did not understand any reasoning processes leading to the formulation of the problem, research questions or hypotheses
Cognition	Methods and results:	Were methods appropriate? Did the student understand methods and results?	10,0%	7,5%		The student applied entirely appropriate research methods, and interpreted the results correctly	The student applied appropriate methods and understood the results, with only a few minor mistakes that did not affect the outcome of the research	Methods were not entirely appropriate, and/or the student showed a fair level of understanding of some methods or results, which negatively affected a part of the research	Methods barely allowed to produce meaningful results, and/or the student's low level of understanding of methods and results negatively affected a large part of the research	The student essentially misunderstood the methods, and/or the results obtained, which led to meaningless research
Cognition	Critical appraisal, integration and creation:	Did the student show ability to critically evaluate the results and integrate these in current thinking to develop new insights?	10,0%	7,5%		The student showed ability to critically and flawlessly integrate the results in current theory and develop highly meaningful new insights	The student showed ability to critically integrate results in current theory and develop meaningful new insights, with a few minor flaws	The student showed ability to critically integrate results in current theory and to develop new insights, but not without some important flaws	The student showed a poor ability to critically integrate results in current theory or to develop new insights that were meaningful	The student failed entirely to critically integrate results with current theory or develop any meaningful new insights
Attitude	Originality:	Did the student convincingly express and defend his/her own ideas to improve the research?	10,0%	10,0%		The student strongly improved the research by means of his/her own and persuasively defended ideas	The student positively influenced the research by means of his/her own and convincingly defended ideas	The student expressed his/her ideas to improve the research but without much determination or conviction	The student hardly attempted to influence the research on the basis of his/her own ideas	The student did not attach his/her own values or ideas to the research
Attitude	Responsiveness and cooperation:	Did the student actively participate in work discussions and communicate well with supervisor and other group members to allow fruitful feedback?	10,0%	10,0%		The student actively participated in all relevant discussion meetings and communicated well with the supervisor and other group members, allowing frequent and highly fruitful feedback	The student participated in most relevant discussion meetings and communicated well with the supervisor but not with other group members, allowing frequent and fruitful feedback	The student participated in some discussion meetings and occasionally communicated to the supervisor but not to other group members, allowing only occasional feedback	The student participated in few relevant discussion meetings and rarely communicated to the supervisor alone, allowing only limited opportunities for feedback	The student essentially worked highly isolated to such a degree that it substantially harmed the research
Execution	Technical performance:	How did the student execute lab work or fieldwork, information analysis, programming or modelling?	10,0%	10,0%		The student executed all activities related to lab- or fieldwork, information analysis, programming or modelling with great precision and without flaws	Only some minor flaws were found in research activities related to lab- or fieldwork, information analysis, programming or modelling	Most research activities related to lab- or fieldwork, information analysis, programming or modelling were performed with minor flaws, but a few with major flaws	Most research activities related to lab- or fieldwork, information analysis, programming or modelling were performed with major flaws	Research activities related to lab- or fieldwork, information analysis, programming or modelling were performed so poorly that the research became meaningless
Execution	Safety and environment:	Was the research (lab work, fieldwork) carried out safely and with respect for environmental issues?	10,0%	10,0%		The student employed high and exemplary standards of safety with respect for relevant environmental issues	The research was done according to the usual recommendations of safety and respect for relevant environmental issues	In some details the research was carried out unsafely or without respect for the environment	In important aspects the research was carried out unsafely or without respect for the environment	The research was carried out unsafely or without respect for the environment
Execution	Independence and initiative:	Did the student perform or and/or initiate high-quality research activities independent from the supervisor?	10,0%	20,0%		The student initiated and mastered all research activities independently from the supervision	The student initiated and mastered most research activities independently from the supervision	The student needed guidance to initiate and master some research activities	For most research activities the student needed frequent and repeated guidance by the supervisor	The student imitated and merely repeated activities shown by the supervision
Execution	Efficiency:	Did the student complete the research within the time period scheduled?	10,0%	10,0%		After accounting for any delays not caused by the student, the research was completed according the proposed plan	After accounting for any delays not caused by the student, the research was completed within two weeks after it should have ended according to the proposal	After accounting for any delays not caused by the student, the research was completed within one month after it should have ended according to the proposal	After accounting for any delays not caused by the student, the research was completed within two months after it should have ended according to the proposal	After accounting for any delays not caused by the student, the research was completed within three months after it should have ended according to the proposal

						Marks from 1 to 10 (1 is very poor, 10 is excellent)				
Report			Weight RP1	Weight RP2	Marks ->	10	8 or 9	7	5 or 6	1, 2, 3 or 4
Cognition, attitude and execution	Title/Abstract:	Did the abstract contain a full but concise summary of the research? Was the title informative?	10%	10,0%		The abstract contained highly informative and short descriptions of methods, results, discussion and relevance of the study; title was highly informative and original	The abstract contained adequate descriptions of methods, results, discussion and relevance of the study; in minor details the text lacked information; title was informative	The abstract contained fair descriptions of methods, results, discussion and relevance of the study; text lacked some important details or was up to 30% too long; title was informative	The abstract contained poor descriptions of methods, results, discussion or relevance of the study; the text lacked several important details and was up to 50% too long; title was not entirely informative	The abstract lacked information regarding methods, results, discussion and relevance of the study; the text was more than 50% too long; title was not informative
Cognition, attitude and execution	Introduction/context:	Was the subject introduced in a correct scientific context? If applicable, was the relevance for society well recognized?	10%	10,0%		Introduction contained a thorough and creative analysis of the context and problem. Research questions and hypotheses were developed coherently and experimental design and expectations were presented concisely. Good placement within field of research. If applicable, excellent treatment of relevance for society, and highly readable for non-expert. A great deal of depth as well as overview was given.	The theoretical context and analysis of the problem was clearly presented. Following this in a logical sequence, the research questions/hypotheses were developed and elaborated, and the experimental design was presented.	The introduction enfolded the corresponding scientific backgrounds to support the relevance of the research problem, and includes a research question/hypothesis, logically linked to theory presented earlier, but not or not meaningfully elaborated; concise descriptions of experimental design are missing.	The relevance of the research problem and the theoretical background were mentioned but the research question or hypothesis were not entirely linked to these issues in a logical way.	The research problem and the scientific background were treated superficially. Research question or hypothesis were not meaningful, and were not embedded in any theoretical context.
Cognition, attitude and execution	Methods:	Were the methods described in such a way that the study could be repeated and that the results could be understood properly? Was a justification given for the choice of methods?	10%	10,0%		The report contains a critical, thorough and concise description and justification of the methods used, making the study repeatable, and allowing full and unequivocal understanding of the results.	The report contains a thorough description and justification of the methods used, making the study repeatable without much further information, and allowing understanding of most results.	The report contains a description of the methods used, but with some omissions that are relevant to repeat the study, or to properly understand the results.	The report contains a description of the methods used, but with several omissions or mistakes so that the repeatability of the study or the understanding of the results is severely hampered	The report contains a description of the methods used, but with so many omissions or mistakes, that the information is utterly inadequate to repeat the study or to understand most results.
Cognition, attitude and execution	Results:	Was the description of the results complete and did they address the research questions/hypotheses? Were interpretations well separated from observations? Are the results ready for publication, if desired?	10%	10,0%		The description of the results was complete and addressed the problem/research questions/hypotheses. They represented the outcomes of the research and were presented without any flaws. The results can be directly used for publication, if desired.	The description of the results was complete and addressed the problem/research questions/hypotheses. The results were presented with only a few minor flaws, and therefore need only a quick validation by the supervisor. They can be used for publication, if desired, after minor modifications.	The description of the results was complete and addressed the problem/research questions/hypotheses. However, observations were not always separated from interpretations, and some flaws were detected that need correction, before publication (if desired) can be attempted.	The description of the results was not complete or insufficiently addressed the problem/research questions/hypotheses. Direct findings were not separated from interpretations, or major flaws were present that need substantial corrections, before any publication (if desired) can be attempted.	The description of the results was incomplete and did not or not fully address problem/research questions/hypotheses. The results failed to describe direct output of the research itself, contained major flaws, and require an unrealistic amount of correction to be used for publication, if desired.
Cognition, attitude and execution	Discussion/conclusion:	Were the results discussed critically in view of the research question? Did the student draw sound conclusions?	10%	10,0%		The student critically and flawlessly discussed the results in view of the problem and research questions/hypotheses. The interpretations were well integrated into those expressed in recent literature. The student meaningfully placed the results in a wide theoretical context, applying a scope that extended to related research domains, emphasizing the relevance of the outcomes for a broad, international community. The student suggested new and highly relevant hypotheses or research plans, and drew convincing conclusions, highlighting the main outcomes.	The student critically discussed the results in view of the problem and research questions/hypotheses. The interpretations were well integrated into those expressed in recent literature, and the outcomes were presented in a meaningful theoretical context but with a narrow scope not extending to related research domains. The student drew convincing conclusions highlighting the main research outcomes.	The student critically discussed the results in view of the problem and research questions/hypotheses. The interpretations were integrated into those expressed in recent literature. However, some flaws were apparent, and the student failed to convincingly present the results in a sound theoretical context. Conclusions were drawn but did not fully represent the main research outcomes.	The student discussed the results in view of the problem and research questions/hypotheses, but without any critical reflection or with critical remarks only addressing methodological shortcomings. The arguments were sometimes flawed. Insufficient correspondence was shown to relevant literature in the field of research. Conclusions were not supported by the results, or were lacking.	The student discussed the results but hardly in view of the problem and research questions/hypotheses, and without critical reflection. Most arguments were flawed. Any integration of interpretations into those expressed in literature was not attempted. Conclusions were not supported by the results, or were lacking.

Cognition, attitude and execution	Use of literature:	Were the quality and quantity of the literature sufficient? Was the literature cited adequately and correctly presented in a list of references?	10%	10,0%		The student used only state-of-the-art and highly relevant references, which were flawlessly presented in a list. All citations were used correctly.	The student used many state-of-the-art and highly relevant references. Only a few references were superfluous. The list of references contained only a few minor errors. Most citations were used correctly.	The student used state-of-the-art and highly relevant references, but some were missing, and others were out-of-date, not relevant, or superfluous. The list of references contained only a few minor errors. Most citations were used correctly.	The student used state-of-the-art and highly relevant references, but several were missing, and many others were out-of-date, not relevant, or superfluous. The list of references contained several errors. Several citations failed to correctly represent the information given by the source.	The student hardly used state-of-the-art or highly relevant references, and most references used were out-of-date, not relevant, or superfluous. The list of references contained several errors. Many citations failed to correctly represent the information given by the source.
Cognition, attitude and execution	Structure:	Was the report clearly written and well-structured?	10%	10,0%		The report was well organized, implying that information in the entire report, but also in individual chapters, sections or paragraphs was presented in a highly readable and logically sound, clear, coherent and well-connected way.	The information in the entire report, but also in individual chapters, sections or paragraphs was presented in a readable and logically sound, coherent and well-connected way. In few parts (in not more than five paragraphs), the text might be somewhat vague or confusing, and a slight degree of disorder might be present.	Generally, the information in the entire report, but also in individual chapters, sections or paragraphs was presented in a readable and logically sound way. However, sometimes it was presented in a somewhat disordered way, reducing coherence. In some parts, in not more than 10 paragraphs, the text was vague or confusing.	The information in the entire report, but also in individual chapters, sections or paragraphs was presented in a disordered way, reducing coherence. The reader had problems in following a logical line of thinking by the author. Many parts of the text were vague or confusing.	The information in the entire report, but also in individual chapters, sections or paragraphs was presented in a strongly disordered way. Any coherence was hard to detect, and the reader had severe problems in recognizing a line of thinking by the author. Many parts of the text were vague or confusing.
Cognition, attitude and execution	Lay-out and language:	Did pictures, figures, graphs and tables support the text? Did the overall lay-out improve the readability? Was the use of the language basically correct as to grammar and spelling?	10%	10,0%		Pictures, figures, graphs and tables greatly supported the text, without redundancy, trivialities or exaggeration. The lay-out warranted excellent readability, and the use of the language was flawless as to grammar and spelling.	Pictures, figures, graphs and tables supported the text but occasionally (less than three times) present some redundant information. The lay-out warranted good readability and the use of the language was mostly correct as to grammar and spelling.	Pictures, figures, graphs and tables supported most of the text but some (less than five occasions) presented redundant information. In some parts the lay-out slightly hampered the readability, and flaws in grammar and spelling were common but not causing misunderstanding.	Several pictures, figures, graphs or tables (in up to ten occasions) presented redundant or trivial information. The lay-out hampered the readability, and flaws in grammar and spelling were common causing some misunderstanding.	Most pictures, figures, graphs or tables presented redundant or trivial information. The lay-out clearly hampered the readability, and the flaws in grammar and spelling were so severe that essential messages could not be understood.
Execution	Efficiency:	Did the student complete the final report within the time period scheduled?	20%	20,0%		After accounting for any delay not caused by the student, the final report was uploaded to DataNose at least one week before the project's end date	After accounting for any delay not caused by the student, the final report was uploaded to DataNose in the week before the project's end date	After accounting for any delay not caused by the student, the final report was uploaded to DataNose within one month after the project's end date	After accounting for any delay not caused by the student, the final report was uploaded to DataNose between one and three months after the project's end date	After accounting for any delay not caused by the student, the final report was uploaded to DataNose three months after the project's end date or later

						Marks from 1 to 10 (1 is very poor, 10 is excellent)				
Oral presentation			Weight RP1	Weight RP2	Marks ->	10	8 or 9	7	5 or 6	1, 2, 3 or 4
Cognition, attitude and execution	Contents:	Did the presentation give an accurate description of the work, including the research question? Has the contribution of the student been indicated explicitly?	25,0%	25,0%		The presentation accurately and critically described the new insights obtained through the principal results of the research project, including the answers to the research questions, embedded in a sound treatment of sources and theory. The contribution to the project by the student was clearly indicated. New insights and directions for future research, as supported by the research results, were convincing.	The presentation accurately and critically described the new insights obtained through the principal results of the research project, including the answers to the research questions, embedded in a sound treatment of sources and theory. The contribution to the project by the student was clearly indicated. New insights or directions for future research were not truly convincing.	The presentation described the principal results of the research project, but not without flaws. Some critical reflections were missing. The student included answers to the research questions but embedded these only weakly in theory. New insights or directions for new research were not considered, or only with trivial content. The contribution to the project by the student was indicated.	The presentation described the principal results of the research project, but with some major flaws. It lacked any serious critical treatment. The answers to the research questions were mentioned but not embedded in theory, and therefore with hardly any meaning to provide new insights or directions for future research. The student's contribution to the project was mentioned.	The presentation did not describe the principal results of the research project and anyhow included major flaws. It lacked any critical treatment. The answers to the research questions were not mentioned. The results were not embedded in theory and no attempt was done to provide a meaningful set of new insights or future research directions. The contribution to the project by the student was not clearly indicated.
Cognition, attitude and execution	Structure of the presentation:	Was the presentation good to follow? Was the information conveyed in a clear, and logically sound sequence, with appropriate timing?	25,0%	25,0%		The information was presented timely, coherently, in a logically sound sequence, and it was easy to follow the line of thinking by the student.	The information was presented timely and in a logically sound sequence, and it was fairly easy to follow the line of thinking by the student. A slight degree of disorder affected the coherence, but did not create any misunderstanding.	The information was presented in logically sound sequence, but the student's line of thought was sometimes hard to follow. Some disorder affected the coherence, and created some misunderstanding in the audience. Slight problems with time.	The information was not really presented in logically sound sequence, and is it hard to follow the line of thinking by the student. Some serious disorders affected the coherence, and created serious misunderstandings in the audience. Clear problems with timing.	The information lacked any logically sound sequence, and any line of thinking by the student cannot be detected. Serious disorders affected the coherence, and created essential misunderstandings in the audience. Essential problems with timing.
Cognition, attitude and execution	Clarity of presentation:	Did the student correctly and effectively use slides, animations, movies, etc.?	25,0%	25,0%		Excellent and original slides or other visual means to convey the message. No redundancy nor any missing slides. Excellent starting slide (or other visual/sound aide) to draw the attention immediately, and a excellent final slide (or other aide) to present take-home message. Readability was fine everywhere, and the audience had sufficient time to grasp what was presented.	Good slides or other visual means to convey the message. Only occasionally a problem with readability. The audience generally had enough time to grasp what was presented.	Good slides or other visual means to convey the message. Readability was sometimes deficient. In some occasions the audience needed more time to grasp what was presented.	Some slides or other visual means (<20%) were deficient to convey the message. Readability was often poor. In frequent occasions the audience had too little time to grasp what was presented.	Many slides or other visual means (>20%) were deficient to convey the message, or simply missing. Readability was often poor. In frequent occasions the audience had too little time to grasp what was presented.
Cognition, attitude and execution	Contact with audience:	Did the student communicate effectively with the audience? Did he/she initiate involvement of the audience?	25,0%	25,0%		Excellent rhythm, pitch, tone and volume of voice. Excellent eye-contact and non-verbal contact (gestures, position, movement) with audience. Discussion initiated, and active involvement of the audience throughout entire presentation.	Generally good rhythm, pitch, tone and volume of voice, but occasionally with deficiencies affecting the message. Good eye-contact and non-verbal contact (gestures, position, movement) with audience, but occasionally with slightly distracting gestures or movements.	Rhythm (too monotonous), pitch (too quick, too slow), tone (not lively, too sober, no humor) and volume of voice (too loud, too soft) with deficiencies that hamper conveying the message. Eye-contact and non-verbal contact (gestures, position, movement) with frequent deficiencies, causing some distraction of the audience.	Rhythm (too monotonous), pitch (too quick, too slow), tone (not lively, too sober, no humor) and volume of voice (too loud, too soft) with pronounced deficiencies that substantially hamper conveying the message. Eye-contact and non-verbal contact (gestures, position, movement) with frequent and strong deficiencies, seriously distracting the attention of the audience.	Rhythm (too monotonous), pitch (too quick, too slow), tone (not lively, too sober, no humor) and volume of voice (too loud, too soft) with strong deficiencies that essentially blocked conveying any message. No eye-contact with the audience whatsoever, and non-verbal contact (gestures, position, movement) with very strong deficiencies, completely distracting the attention of the audience.