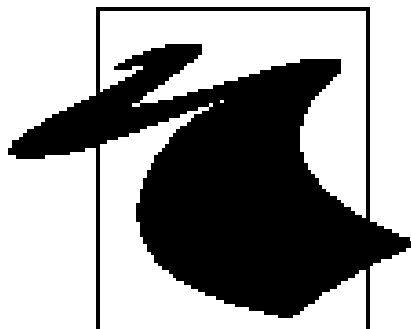


Graduation/Thesis Brochure

**'Towards professionalism'
education through training 2 (bwl2)**



**hogeschool
Leiden**

Date: 28th January 2009
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Graduation coordinator: Marja Krosenbrink-Gruijters

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1. Introduction

The discovery of the humane genome in 2001 has resulted in a silent revolution in the field of bioscience. Since then, research laboratories have been able to collect enormous amounts of biological data with relative ease, in which the analysis of these data by bioinformaticists is now obstructing the progress of the research. In the years to come, thousands of bioinformaticists will be needed in the Netherlands.

In 2003 Hogeschool Leiden initiated a fulltime four-year bachelor's degree program in Bioinformatics. In the bioinformatics curriculum, learning in and with a professional environment stands paramount. Starting in their second year, students work at school on assignments that are presented to them from the professional field. In the third and fourth years, a total of one year has been reserved for internship and graduation. This enables students to learn how to function as a bioinformaticist in the professional field. This is a very important part of the curriculum, because the professional field requires independent and creative professionals who are able to solve problems adequately in constantly changing situations. This requires insight into relevant professional situations, being able to assess the implications of specific actions and being able to reflect on your own abilities.

The Bioinformatics Department at Hogeschool Leiden showcases itself as a program where learning to adopt a professional attitude stands paramount. It is only then that one can obtain knowledge and expertise efficiently and effectively in relation to professional practice.

In this document, various aspects of the graduation process will be discussed to provide insight to both the student and the host institution providing a thesis position.

Wherever in this document a person is addressed as 'he' it is meant to be understood as 'he' or 'she'. This also applies to the words 'his' or 'her'.

2. Definitions

Thesis supervisor	The person supervising the student at the host institution where the student is carrying out his/her thesis.
Graduation contract	Contract concluded at the commencement of the graduation process between the student and his supervisor recording agreements concerning his/her graduation/thesis. This is also referred to as an internship contract.
Graduation coordinator	The person coordinating the graduation process at the Bioinformatics Department of the Hogeschool Leiden.
Thesis lecturer	The lecturer from Hogeschool Leiden supervising the student and holding the evaluation interviews.
Thesis plan	A plan of approach in which attention is paid to the description of the organisation or institution where the student is carrying out his thesis, the content of the work carried out by the student and the planning.
Host institution	The company or institution where the student is compiling his thesis.
Thesis	The final report of the student describing the assignment that was completed and its results.
Graduation	The period of 20 weeks (maximum of 26 weeks) in which at least 95 days of 8 hours work is carried out on the thesis subject. The exact start date can vary per person.
Assessor	A lecturer at Hogeschool Leiden appointed by the graduation coordinator who evaluates the student during the viva voce examination and awards the final mark.
Examiner	The thesis lecturer presiding over the viva voce examination.
Second examiner	External expert who jointly assesses the reports and presentation of the student.
The curriculum	The course of study presented by the Department of Bioinformatics at Hogeschool Leiden
OER (CER)	The curriculum and examination regulations of the course of study. This prevails in case of ambiguity or contradictions as to the interpretation of this document.
Internship application form	Form filled out by the student stating where he or she will be compiling his/her thesis and the assignment he or she will be completing. This form is submitted to the student's mentor for

Student	approval. The student enrolled in the Bioinformatics program at Hogeschool Leiden.
Mentor	Lecturer at the Hogeschool Leiden who supervises and offers guidance to the student and approves the thesis.

3. Graduation prerequisites

To be able to start work on a thesis subject, a student must have been awarded at least 207 EC (also see CER) of the curriculum (major + minor(s)).

In addition, the thesis subject and the thesis position must have been approved by the student's mentor and a second lecturer.

For an approval of an graduation abroad, the student should meet these requirements (in addition to the requirements described above):

- the student needs approval for his graduation abroad from the head of the department
- the student has signed the "my safety" form and send this form to the graduation coordinator

4. Differences between internship and graduation

At first glance, there seems to be little difference between internship and a thesis. In both modules, a student will work within the professional field for about 20 weeks and will write a report in conclusion. There are, however, also a number of essential differences:

- In a thesis, the student must prove that he can function at professional level. The burden of the proof falls on the student. During the internship, the student's level of functioning will not be as high.
- Scheduling of the graduation process is not as flexible as during internship. Graduation dates have been scheduled in advance, as well as other related activities, as described in paragraph 7.4. It is the student's own responsibility to adhere to this schedule.
- The first interview of the graduation process will take place at an earlier stage than during internship. The student must be able to submit the thesis plan at an earlier stage in the process than during internship.
- Ten weeks after commencement of the graduation process the student must already have compiled the majority of his thesis. This is essential as the thesis is due in week 17.
- At the viva voce examination, the student will give a presentation about his thesis subject. During this presentation, a second examiner will also be asked to evaluate the student's performance.

5. Thesis description

The student must describe his individual thesis subject in the application form. The description must include the following points:

- a) the organisation,
- b) the activities to be performed,
- c) the competencies to be developed during this graduation period,
- d) the nature and scope of the supervision

The content of the thesis and the thesis position must meet the following requirements:

- Individual assignment
The student must be able to demonstrate his/her ability to function independently as a bioinformaticist. This is why the student is required to perform an individual assignment. If there are several students all carrying out thesis subjects at the same institution, the scope of the assignments must be clearly defined. These students will also be assigned different examiners so that the students can be evaluated individually.
- Biology Component
The biology aspect of the assignment must be clearly presented in the thesis. This must also be reflected in the thesis.
- Informatics Component
The thesis must also include an informatics component. This must also be reflected in the thesis.
- Theoretical Framework
The thesis must be embedded in a (scientific) theoretical framework. In his thesis, the student must prove having read sufficient scientific literature; at least 10 papers.
- Feasible within the given term
- Head-tail
The thesis must have a 'head' and a 'tail'. A graduation period can also encompass multiple assignments, as long as these can all be rounded off.
- Higher vocational level
In performing his thesis, the student must be able to meet the final qualifications required for a bachelor's degree in Bioinformatics (as described in Appendix I and Paragraph 9). These competencies are based on the competencies described for the degree of Bachelor in Applied Science.
- Relevant within student's curriculum
The thesis must be in line with the curriculum followed by the student. The student carries the responsibility for this himself. Evaluation of this will be done by the student's mentor.
- Available knowledge of bioinformatics
There must be ample knowledge on the subject of bioinformatics within the host institution or the student must be able to approach an external bioinformaticist easily, so that the student can be provided sufficient guidance as to the content of his thesis.

- Host institution for thesis must be different from internship
It is not permitted to carry out your thesis assignment at the same institution and/or with the same supervisor as your internship.

6. Host Institution

To be assured of a successful graduation for the graduation project, the student, as well as the curriculum, a number of requirements must be met pertaining to the host institution. These requirements are (but are not limited to):

- an individual workplace for the student that meets the Occupational Health and Safety Requirements,
- within the organisation, a thesis supervisor will be responsible for supervising the student (both on the content of the assignment as well as with organisation). The thesis supervisor will have regular contact with the student and will participate in evaluation interviews,
- the thesis supervisor will ensure commitment of the organisation as regards the graduation process and thesis,
- this commitment will be recorded in a graduation contract. The responsibility for concluding the graduation contract lies with the student and the thesis provider. An example internship/graduation contract has been included in appendix II. If you wish to make use of another internship contract or have any questions, please contact the graduation coordinator.

7. Program of activities surrounding the graduation process

Finding a thesis position

- Every student is responsible for finding his/her own thesis position. The student can approach host institutions independently or he can consult a list of candidate internship and thesis position providers compiled for the Bioinformatics Department. This list can be found on the blackboard in the "*Bioinformatics: internship and thesis*" course.
- After consulting with his thesis supervisor, the student will formulate his individual thesis and record this in the internship application form (Appendix III). This assignment will then be submitted for approval to the student's mentor. This assignment will then be submitted for approval to the student's mentor, at least 4 weeks before start of the graduation.
- The mentor will then consult with a second lecturer about the thesis subject.
- If the thesis subject is approved by both lecturers, it will be forwarded to the graduation coordinator. The graduation coordinator will appoint an examiner. If the thesis is not approved, the student's mentor will explain to the student how the thesis subject can be adapted or that a new thesis subject must be selected.

- The thesis supervisor and the student will receive written confirmation regarding the approval status of the thesis. The moment a student can actually start the graduation process depends on when the student has completed the prerequisites mentioned under paragraph 3.

Graduation

- The student must inform his/her thesis lecturer that he/she is ready to start the graduation process.
- The thesis plan must be submitted to the thesis lecturer and graduation coordinator in the second week of the graduation period.
- In the third or fourth week of the graduation period, the thesis supervisor, the student and the thesis lecturer will discuss the thesis plan to make a definite schedule of the planning and the work to be carried out. **The student is responsible for scheduling this interview.**
- The student must submit a written mid-term report to the thesis lecturer in week 10. See paragraph 8.2 for more details.
- A mid-term evaluation will take place in week 10. The (mid-term) evaluation form (see Appendix IV) must be sent to the thesis supervisor by e-mail. The results of this evaluation will be assessed by the thesis lecturer. If desired by the thesis supervisor, the student or the thesis lecturer, an appointment can be scheduled to discuss the evaluation.
- The student will submit the final report in quadruplicate to the Servicedesk of the Hogeschool Leiden in week 17.
- The graduation coordinator will appoint an assessor.
- Based on the submitted reports, the thesis lecturer and the appointed assessor will declare a definitive go/no go decision for the viva voce examination. An appeal against this decision can be submitted to the graduation coordinator and, afterwards, to the Examination Committee of the relevant department.
- In week 19 or 20, the student will defend his/her thesis at the viva voce examination and will provide an account of his thesis activities. The thesis supervisor must be present at the viva voce examination.

Viva voce examination

The student will defend his thesis at the viva voce examination, where he/she will also be required to answer questions pertaining to the thesis subject. A second examiner may be present at the viva voce. You will find a brief overview of the viva voce examination procedure below.

- The examiner will open the viva voce examination.
- The student will present his thesis defence in 20-30 minutes.
- The assessor, second examiner, thesis supervisor and the examiner will be given 20 minutes to pose questions about the thesis.

- The student will leave the hall and the second examiner, the examiner, the assessor and the thesis supervisor will evaluate the work carried out by the student during the graduation project, the thesis and the student's presentation. The assessor will determine the final mark.
- The assessor will write the mark on the verbatim report of the viva voce examination.
- The second examiner, the thesis supervisor and the examiner will sign the verbatim report as having been read.
- The examiner will call the student in and the assessor will present the evaluation and the final mark.
- The viva voce examination will be closed by the examiner.
- The assessor will submit the verbatim report to the graduation coordinator.
- The graduation coordinator will submit the final mark to Study Progress.
- The graduation coordinator will forward the verbatim account to the exam bureau, who will then ensure a speedy processing of the diploma.

Summary of the thesis supervisor's activities

week	event	tasks
1	commencement of graduation period	
2	student submits thesis plan to thesis lecturer and graduation coordinator	help the student with formulating his plan of approach
3-4	<ul style="list-style-type: none"> ▪ the thesis lecturer visits the thesis institution (if this is in the Netherlands). ▪ the thesis lecturer telephones the thesis supervisor and the student (if this is not in the Netherlands). 	interview
10	student submits written mid-term report	help the student with formulating his mid-term report
10	reception of evaluation form	fill in and return the form
17	student submits thesis to servicedesk	assist the student in writing the thesis. Approval of the thesis.
19-20	viva voce examination	attend the viva voce examination at Hogeschool Leiden

If any unforeseen circumstances should arise, an appeal can be made to the examiner, in second place to the graduation coordinator and in third place to the Examination Committee of the department.

8. Documents to be submitted

Thesis plan

The thesis plan (approved by the thesis supervisor) must be submitted to the thesis lecturer no later than 2 weeks after commencement of the graduation period. This plan, which could be called a plan of approach with respect to education through training, will call attention to at least the following subjects:

Organisational aspects

- Student's details
- Host institution's details
- Thesis supervisor's details
- Examiner/thesis lecturer's details

Description of the thesis subject

- Problem Definition
- Concrete assignment description
- Work to be performed:
- The competencies to be developed during this period
- Detailed planning
- Activities not immediately related to the subject
- Risks and coverage of these risks
- The nature and scope of the supervision

This thesis plan will be the subject of discussion during the first interview between the thesis supervisor, the student and the thesis lecturer/examiner.

Written mid-term report

The student must submit a written mid-term report in week 10. This written mid-term report must include, in any case, the (definitive) introduction, materials and methods as well as the first results of the thesis.

Thesis

The thesis must be submitted in quadruplicate to the servicedesk in week 17. This report must have the format of a scientific paper, namely:

- 1) Summary
- 2) Introduction (with presentation of the question!)
- 3) Materials & Methods
- 4) Results
- 5) Conclusion & Discussion
- 6) Reference list

Appendix V contains a detailed description of the requirements that the thesis must meet. If desired by the student and the thesis supervisor, the report may be written in the English language. Just as in a report written in the Dutch language, the report must be written using grammatically correct language. The thesis supervisor is responsible for offering support to students writing their thesis in English.

The thesis will be evaluated as presented in detail in Appendix VI. Based on the thesis and process report, the thesis lecturer/examiner and the appointed assessor will provide a go or no-go indication for the viva voce examination.

Defence of the thesis

During the viva voce examination, the student will give a presentation of about 20-30 minutes in which he/she will offer explanation about the work described in the thesis. In addition, the student will also be required to answer questions posed by the examiner, the assessor and the second examiner.

Re-examination

If you receive an unsatisfactory mark (5 or lower) during the viva voce examination, you must complete the entire graduation period once more in another environment (read: another thesis position).

When the thesis has not been submitted after 26 weeks, the mark "1" will be awarded. Approval for delay of submission of the report and presentation can be obtained from the Examination Committee (bioinformatica.examencommissie@hsleiden.nl).

After an unsatisfactory mark (5 or lower) has been awarded (when the report has not been submitted or a no-go indication for a viva voce examination), the student has only one change to achieve a better mark for this graduation assignment. The deadline for submitting the thesis will be determined by the thesis lecturer and thesis supervisor and will be reported by mail to the graduation coordinator. When the student fails to submit the thesis before the deadline or his work has been awarded with a 5 or lower, the student has to complete the entire graduation period once more in another environment (read: another thesis position).

9. Assessment criteria

The assessment criteria required of a student are as follows:

- The student is able to complete an assignment from the professional field of bioinformatics independently and/or within a multidisciplinary team.
- The student is able to approach this assignment on a project basis and by

working in a solution-oriented manner, can collect the required information from recent (scientific) sources and can discuss the results within a multidisciplinary team.

- The student can function as part of a multidisciplinary team and can communicate with different professionals within the organisation.
- The student can store his data and make this data available to professionals within the organisation.
- The student can describe results in a report comprising an introduction, materials and methods, results and discussion; in conformity with the scientific requirements from the field of profession to which the report has been geared.
- The student can present results independently to lecturers at the bioinformatics department and interested parties from the field, and can answer questions concerning his work.

A detailed overview of the assessment criteria with respect to reports and competencies is available in Appendix VI.

10. Do you have a thesis subject?

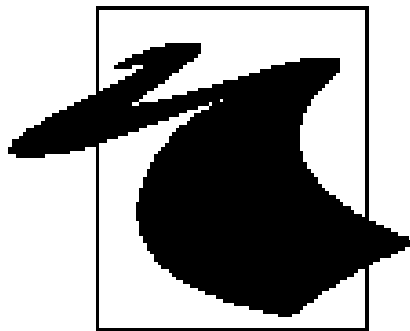
Please send a note including your name, e-mail address and several core words summarising your intended research to krosenbrink.m@hsleiden.nl. Your details will then be added to the list of candidates for internships and thesis positions. If a student is interested in graduating under your supervision, he or she will contact you.

If you have any questions, please contact the thesis supervisor or graduation coordinator Marja Krosenbrink-Gruijters, krosenbrink.m@hsleiden.nl, telephone number +31-71-5188561.

APPENDIX I

Competencies Bachelor of Applied Science

Required level for graduation.



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Information in this appendix has been taken in part from the document “Bachelor of Applied Science: a competency-oriented profile description” dated 22 March 2007.

Appendix I: Competencies Bachelor of Applied Science

Agreements in the field of higher education at European level were concluded in Bologna in 1999 that, in the past few years, have led to substantial reforms. To create flexible international academic curricula, the Anglo-Saxon Bachelor – Master (BaMa) structure was adopted, as well as a common system of titles for all member states. A common system of recognisable titles will be conducive to promoting the employability of university graduates in a globalising economy. A common European credit system was also adopted: the European Credit Transfer System, with one ECTS credit representing 28 hours of study.

In the Netherlands, a start was made in 2002 by incorporating the bachelor-master structure into both higher vocational training (HBO) and university education (WO). This change gave rise to reforms in the existing educational system and also served to simplify their structure. In technical higher vocational education, where a total of some 40 different degrees could be obtained, the Netherlands Association of Universities of Applied Sciences (HBO-raad) HTNO and the corresponding advisory board took it upon themselves to expand the possibilities for the existing educational programs. At the recommendation of the HTNO working group for the expansion of bachelor programs, the Netherlands Association of Universities of Applied Sciences (HBO-raad) introduced four bachelor programs in 2003 and requested that the Universities of Applied Sciences (in Dutch: Hogescholen) classify their programs accordingly: Bachelor of Engineering, Bachelor of Built Environment, Bachelor of Information and Communication Technology or Bachelor of Applied Science.

The Bioinformatics program at Hogeschool Leiden is categorised as Bachelor of Applied Science. The competencies for the Applied Science program have been formulated based on the existing national professional and educational profiles. The profile for the Applied Science program consists of eight competencies, of which seven are applicable to the field of bioinformatics. The seven competencies according to Domain of Applied Science (DAS) are described below.

1. Research

The Bachelor of Applied Science can conduct research within the field of Applied Science that will either contribute to the solution of a problem or will lead to greater insight into a topic within the own working environment.

The student can demonstrate this by:

- a. demonstrating an adequate level of expertise by being able to find and analyse problems in the field of science;
- b. being able to formulate the objectives of a desired research project by taking the questions as point of departure;
- c. being able to select and obtain (scientific) literature independently in order to gain in-depth understanding of a problem and subsequently being able to assess the reliability of various different sources of information;
- d. being able to set up a feasible and sustainable plan of work (including budget) in which thought has been given to the quality control, safety, health, well-being, the environment and ethics;
- e. being able to carry out, or have carried out, the plan of work systematically by using relevant models, working methods and equipment;
- f. being able to work together within a multidisciplinary team;
- g. being able to summarise, organise and interpret the results in the context of the research topic;
- h. being able to report the results of the research in accordance with the prevailing professional standards;
- i. being able to propose follow-up research projects based on the obtained results;

2. Experiments

The Bachelor of Applied Science is able to conduct experiments within the field of Applied Science and to obtain demonstrably reliable results.

The student can demonstrate this by:

- a. adapting a research topic into an adequate experimental plan including operating procedures;
- b. demonstrating adequate level of knowledge, insight and skill to carry out work in a responsible, safe and critical manner incorporating the correct methods, techniques and equipment;
- c. working to acquire more in-depth knowledge independently with respect to methods and backgrounds (including the possibilities and limitations of certain equipment);
- d. being able to comply with working procedures meticulously and to adapt them if necessary, so that demonstrably reliable and reproducible results will be obtained;
- e. being able to comply with safety, health, environmental and hygienic standards and conducting experiments in as sustainable a manner as possible;
- f. being able to apply (statistic) methods in order to process/validate results and to guarantee their standard of quality;
- g. being able to report the results of the research according to the professional standard;
- h. being able to propose follow-up experiments based on the obtained results;
- i. being able to reach the intended objective by applying project planning.

4. Managing/coordinating

The Bachelor of Applied Science can develop, implement and maintain a (data) management system in the field of Applied Science or components thereof, so that the system will meet the requirements with respect to the law and legislation, standard of quality and the values and standards of the organisation.

The student can demonstrate this by:

- a. being able to analyse possible problems with respect to the development, operation and maintenance of a (data) management system;
- b. being able to set up, operate and evaluate a plan of improvement that can be used to solve problems in a creative, structured and economically sound manner;
- c. taking into account law and legislation and (internationally) applicable values and standards, especially with respect to sustainability and reliability;
- d. being able to coordinate activities with respect to the development, implementation and maintenance of the (data) management system (or components thereof);
- e. being able to report and present information according to the applicable professional standards;
- f. being able to inform employees adequately about the content and applicability of the (data)management system and any possible modifications.

5. Providing advice about sales/purchase

The Bachelor of Applied Science is able to provide substantiated advice about the design, improvement and applicability of products, processes and methods and can conclude profitable transactions with respect to products and services within the field of Applied Science.

The student can demonstrate this by:

- a. adopting a service-minded attitude;
- b. being able to explain questions posed by the principal;
- c. being able to set up and conduct (market) research;
- d. being able to formulate (partial) recommendations;
- e. being able to translate demands/questions made by clients into feasible solutions or recommendations in consultation with researchers and developers;
- f. being able to maintain relations with clients in an adequate manner;
- g. being able to formulate (parts of) marketing plans;
- h. being able to make use of negotiating tactics in purchase and sales.

6. **Instructing/supervising/teaching/coaching**

The Bachelor of Applied Science can instruct and supervise employees and clients to help them obtain new information and skills in the field of Applied Science.

The student can demonstrate this by:

- a. being able to compile theoretical introductions, instructions and demonstrations independently and presenting these to employees and students with respect to practical experiments, instructions for the use of equipment, materials etc.;
- b. being able to supervise employees or students in the field of methods and equipment in use, as well as being able to conduct a literature search for (practical) assignments;
- c. being able to apply didactic skills in various learning situations;
- d. being able to coach employees and teams in the development of their knowledge and expertise;
- e. being able to evaluate the results of the instructions, training and/or other learning.

7. **Leadership/management**

The Bachelor of Applied Science can provide direction and leadership in organisational processes and to employees involved in these in the realisation of certain objectives pertaining to the organisation department or project that he/she is supervising.

The student can demonstrate this by:

- a. having and demonstrating a philosophy with respect to the organisational department;
- b. being able to work in a systematic manner and on a project basis;
- c. being able to coach employees by inspiring, convincing, and motivating them; by showing respect; by stimulating cooperation and by delegating tasks;
- d. setting a good example for his/her employees;
- e. instilling employees with a feeling of shared responsibility;
- f. being able to chair meetings and work consultations;
- g. being able to communicate so that the objectives and tasks are clearly defined;
- h. being able to manage a project in terms of time, money, quality, information and organisation.

8. **Self-regulation**

The Bachelor of Applied Science is able to regulate himself and, in his development, ensures that he is abreast of recent developments as regards skills and knowledge, also in relation to ethical dilemmas and social values.

Appendix I: Competencies Bachelor of Applied Science

The student can demonstrate this by:

- a. being able to determine learning objectives and strategies, to implement these and to be able to analyse these in relation to the learning objective;
- b. being able to adapt himself to changing working environments;
- c. being able to make choices with respect to professional and ethical issues and to attain a decision based on the accepted standards and values;
- d. being able to receive and give feedback;
- e. being able to evaluate, account for and incorporate his/her own thoughts and actions.

Consequently, levels to measure the extent of these competencies are described below:

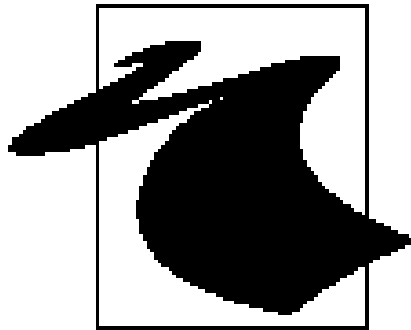
Level	Description
I	Being able to demonstrate effective behaviour as the environment demands. Key words: carry out, at the order of
II	Being able to demonstrate effective behaviour at one's own initiative. Key words: solving, analysing
III	Being able to inspire effective behaviour in others working in the direct environment, mainly by setting a good example. Key words: integration, development, transfer of knowledge and expertise
IV	Being able to inspire the effective behaviour of others working within the organisation and, in doing so, increasing the level of competency within the organisational (department). Key words: generating knowledge

During the graduation project, the student must attain the following levels:

1	2	4	5	6	7	8
3 Research	3 Experiments	2 Management	2 Advising	2 Instruction	2 Leadership	3 Self-regulation

APPENDIX II

Example of a graduation contract



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Internship/graduation contract compiled by the Netherlands Association of Universities of Applied Sciences (HBO-raad).

Dutch Student – Trainee Agreement PART I

- A copy of the passport of the student-trainee must be attached to this form
 - This form must be present at the address where the internship is fulfilled
-

Personal information international student

Family name

First name

Date of birth

day/month/year

Place of birth

Citizen of

Is a residence permit required?

Yes/No

Dutch residence permit number

Is a copy of the passport attached? Yes/No

Telephone

E-mail

Home address during the
internship

Telephone

Information Dutch educational institution

Name of educational institution

Address

Telephone

E-mail

Unit of educational programme (e.g. faculty)

Name of Educational Supervisor

Telephone

Fax

Appendix II: Example of a graduation contract

E-mail

Information host organisation

Name of host organisation

Internship address for student-trainee during the training period

Telephone

Fax

E-mail

Name of on-site Supervisor

Telephone

Fax

E-mail

Internship agreement

Article 1: Objectives and tasks of the internship

- The purpose of this internship is to provide the student with experience of the practical application of theoretical knowledge he or she has already acquired and to acquire new skills and knowledge. The host organisation and the educational institution will ensure that the student-trainee is given tasks and responsibilities according to the level of competence of the student and the educational objectives for the training period. This agreement therefore is not an employment contract.
- **Educational objectives:** skills and knowledge to be acquired, defined by the Educational Supervisor.

- **Tasks of student-trainee:** responsibilities in order to meet these objectives, defined by the on-site Supervisor in consultation with the Educational Supervisor.

Article 2: Supervision and evaluation

- The educational institution (or unit of educational programme like a faculty) will assign an Educational Supervisor responsible for the student's internship and the host organisation will name an on-site Supervisor. If any problems arise, the on-site Supervisor will contact the Educational

Supervisor.

- At the end of the internship the educational institution requires a report from the student-trainee, the detailed requirements for this report will be available to the student before the internship begins. The host organisation will be presented a copy of this report.
- The host organisation will provide the student-trainee with an evaluation of his or her internship as well as a written confirmation that the scheduled work programme has been undertaken and completed.
-

Article 3: Internship arrangements

- The number of envisaged ECTS points for the internship:
- The training period will take place excluding the (parts of) days that the staff of host organisation is not working:
from to
- The daily schedule of working hours of the host organisation applies to the student. The minimal hours per week of internship will be:
- Student-trainee will not be present at the host organisation on:
- The student-trainee must comply with all the regulations of the host organisation.
- The compensation for expenses per month will be:
- The compensation for travel expenses will be:
- The host organisation offers the necessary facilities for the student-trainee to execute his tasks and achieve his/her objectives.
- The student-trainee is obliged to apply secrecy to his or her activities during the internship at the host organisation if requested by the host organisation.
- The author's rights on the achieved results lie with the student-trainee if not explicitly regulated otherwise. Both the student-trainee and the Dutch educational institution may use the results for internal purposes without consultation of the host organisation..
- The written internship report must be presented to the on-site supervisor before it is handed in to the educational supervisor.

Article 4: Social protection / Insurance

- The host organisation will protect the student-trainee against any form of intimidation or discrimination at the workplace. The principle of equal rights will prevail.
- According to Dutch law (art. 7:658 lid 4 *Burgerlijk Wetboek*) the host organisation is liable for injuries and damage that the student-trainee may suffer from during his/her internship.

- The student-trainee will make sure that an insurance is concluded for accidents and liability in the workplace by either the host organisation or the student-trainee itself according to Dutch law.

Accidents insurance number

Liability insurance number

Article 5: Dispute

The student-trainee addresses the on-site supervisor of the host organisation in the first place in case of a dispute. If the dispute cannot be settled amicably between the student-trainee and the on-site supervisor it will be presented to the educational supervisor in order to try to reach a solution suitable to all parties.

Article 6: End and ending of the internship

1. The internship ends
 - a After the period agreed in article 3.
 - b If the student-trainee ends his study at the Dutch educational institution.
 - c If all parties agree to end the internship.
 - d If the student-trainee dies.
 - e If the host organisation is bankrupt or will be dissolved.
2. The host organisation can end this agreement, having heard the student-trainee and educational supervisor :
 - a If the on-site supervisor concludes that the student-trainee is not following the rules of the host organisation or the directions of the on-site supervisor.
 - b If the student-trainee does not comply with the regulations with regard to secrecy as agreed upon in article 3.
 - c If the student-trainee acts in a way that a host organisation cannot be requested to accept according good reason.The on-site supervisor informs the educational supervisor about any ending of the internship.
3. The educational institution can end this agreement, having heard the educational supervisor, the student-trainee and the on-site supervisor if the educational institution concludes that the internship is not complying with the educational objectives and/or the tasks laid out in this agreement or the student-trainee cannot be requested to deal with issues according to good reason. The educational supervisor informs the on-site supervisor about any ending of the internship.

Article 7: General provisions

1. Deviations from the articles in this agreement must be agreed upon in writing by the educational supervisor, the student-trainee and the on-site supervisor.
2. This agreement will be governed by Dutch law.

Signatures

Appendix II: Example of a graduation contract

The signatories confirm the accuracy of all statements made on this form and agree to all principles and articles expressed therein.

- Name of educational institution

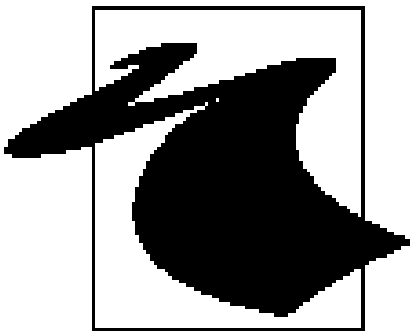
Signature, stamp and date
 - Name of host organisation

Signature, stamp and date
 - Name of international student

Signature and date
-

APPENDIX III

Internship application form



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INTERNSHIP APPLICATION FORM

Informatics of computer science: iwl2 / iwl3 *

Bioinformatics : bwl1 / bwl2 *

Name :

Student nr. :

*** cross out what is not applicable.**

**ALL INTERNSHIPS MUST BE APPROVED BY YOUR MENTOR VIA THIS FORM.
AFTER IT HAS BEEN APPROVED, SUBMIT THE SIGNED FORM TO THE
INTERNSHIP/GRADUATIONCOORDINATOR.**

STUDENT DETAILS

Name :
Address :
City/Town :
Telephone :
Mobile :
School email :
Personal email :
Class :
Student nr. :

INTERNSHIP DETAILS

Host institution :
Name internship supervisor :
Name of contact*) :
Department :
Address :
Postal code and city :
P.O. Box :
Postal code and city :
Telephone :
Mobile :
E-mail internship supervisor :
URL :
Country :

*) if other than internship supervisor

THE INTERNSHIP:

Starting date :
End date :
Hours per week :
Location of the work :
Email-address host institution :

If this does not concern a first internship, the following details are also required:

Previous host institution :
Previous internship period :
Previous internship :
Previous internship activities :

Provide a brief description of your host institution:

Provide a brief description of your internship assignment, as formulated by your host institution:

Provide a description of the scope and nature of the activities to be performed for satisfactory completion of the assignment:

Appendix III: Internship Application Form

TO BE COMPLETED BY THE FACULTY:

Mentor

Name:

Approved: *yes/no*

Signature:

Second lecturer

Name:

Approved: *yes/no*

Signature:

Date:

Date:

Remarks:

Internship coordinator

Assigned supervising lecturer:

Signature:

Date:

IF INTERNSHIP/GRADUATION IS ABBROAD:

HEAD OF FACULTY

Approved: *yes/no*

Signature:

date:

Remarks:

TO BE COMPLETED BY THE FACULTY:

Registration number host institution:

Registration number internship:

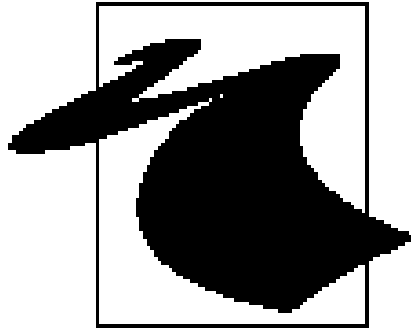
Processing in internship data base: (date)

Copy of form for mentor: (date)

Copy of form for student: (date)

APPENDIX IV

Evaluation form



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Appendix IV: Evaluation form

Student (name + number)	
Host institution (name)	
Internship/thesis supervisor	
Date	
Course code (iwl2 – iwl3 - bwl1 -bwl2)	
Evaluation type	Mid-term evaluation / Final evaluation

This form is used during the mid-term and final evaluation of the internship and the thesis. It is completed by the supervisor and discussed with the student and the lecturer. The marks have been assigned the following values:

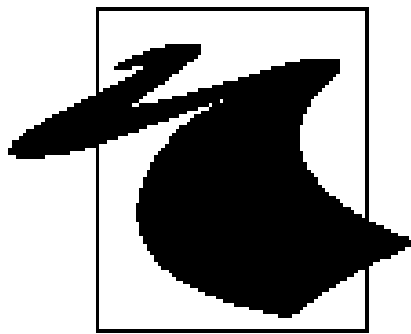
1 = poor, 2 = mediocre, 3 = satisfactory, 4 = good and 5 = excellent.

x = unknown, not applicable or not assessable.

Component	1	2	3	4	5	x	Remark(s)
<i>Insight</i> - can settle in quickly - planning and organisation; - decision-making							
<i>Communication</i> - listening - formulating ideas - contact with employees - contact with management - cooperation - attitude towards criticism - writing skills - documentation							
<i>Characteristic</i> - being able to motivate/convince - development of initiatives - putting forth own ideas - creative - helpful - independent							
<i>Accuracy/punctuality</i> - meeting commitments - analytical capacities - input/working pace - critical of own performance							
<i>Other</i> (professional knowledge and skills):							

APPENDIX V

Thesis requirements



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Writing a thesis: an overview

General

A report, just like a presentation, is a way to communicate to others about the work/research you have just carried out. A report has a similar function to that of a paper and, as such, makes use of the same organisational structure. The difference between a report and a paper is that a paper can only be written once the research question has been answered, and that a report provides an account of an experiment or an internship. This is why a report can also describe negative research results.

When writing a report it is essential to bear in mind that it will be read by others and that, to accommodate the reader, it must therefore be written in an easily accessible manner. This can be attained by:

- writing as shortly and succinctly as possible, leaving out unnecessary information; reconsidering every sentence/word as to whether or not it really needs to be written down;
- trying to avoid complex sentences;
- guiding the reader through the report; explaining relationships between different texts clearly and indicating your reasons for performing experiments;
- avoiding too many passive sentences; using active sentences whenever possible (NOT: in this report is described...BUT: This report describes research in which...);
- no spelling or grammatical errors. All of the above will detract from the content of your report.

Furthermore, it is unconventional to use *we//one* in a sentence (NOT: I have investigated...; BUT: This report describes research in which...);

Other tips:

- Once you have written a text, it is difficult to see your own mistakes. This is why it is helpful to put your text or report away for a day or two before reviewing it;
- Read your report out loud: you will notice whether or not the sentences run well;
- Ask a fellow student to read your report and to give you some feedback;
- Ask your supervisor if he/she will read your draft.

Structure of a report

A report must contain the following parts:

- Summary (Abstract)
- Introduction
- Materials and Methods
- Results
- Discussion
- References

Graphs and tables

Include graphs and tables to display your results. Pay attention to the following:

- Number the graphs and tables, provide them with a title and a brief description (not always necessary);
- Designate axes and units.

Content: elaboration

The objective, content and manner of every part of the report will be described below.

- Summary (Abstract)

Objective: Provides the reader with an idea about the content; will it be interesting to him/her? So: keep it short and succinct.

Content: Research question, method of answering, results, conclusion.

Language: Use the present tense.

Tip: Write the summary last!

- Introduction

Objective: Indicate your reasons for conducting this research.

Content: The most important thing you need to describe here is the research question. Provide a short introduction about the topic and the relevant literature.

Language: Use the present tense.

Tip: Start with the introduction, so that you are fully aware of why you are conducting this research and the results that are important for your report.

- Materials and Methods

Objective: Describe how you have gone about answering your research question.

Content: Describe 'what' you have used for your analyses (which programs, but also which biological material) and how these analyses and experiments were conducted. Do not compile a logbook, but describe the big picture (not step-by-step). NOT: Opened Excel, selected data, then filtered data with an auto filter with a log₂ Cy3/Cy5 value higher than 2.5. Then selected all log₂ Cy3/Cy5 values smaller than -2.5. These data were then copied to a new file. BUT: Genes were considered differentially expressed if the log₂ Cy3/Cy5 values were greater than 2.5 or smaller than -2.5.

Language: Use the past tense.

Tip: Write the Materials & Methods while you are conducting the research/experiments. This will help you to write it faster.

- Results

Objective: Describing your results.

Content: Describe the results of your experiments/analyses. In these results you may also describe experiments that were not successful. If you have any graphs or tables, you can describe the data according to these graphs and tables (refer to them in your text). DO NOT PROVIDE A CONCLUSION YET!

Language: Use the past tense.

Tip: To guide your reader through the text and to make it easy to read, people often mention how an experiment has been conducted or their reasons for conducting this particular experiment.

- Discussion

Objective: Answering the research question.

Content: Discuss the results of your experiment and draw up conclusions. Discuss the 'weak spots' in your experiment that have influenced your conclusion. Compare your results with the results you have gathered from experiments taken from literature. Do these serve to reinforce your own conclusion or does this call new questions to the foreground? If this requires new experiments in order to answer your research question, mention these. For negative results, discuss the (possible) causes.

Language: Use the present tense as often as possible.

Tip: Write the discussion after the results, introduction and materials & methods. Literature that was discussed in the introduction can now be discussed again.

- References

The list of references consists of all the (scientific) papers and books that were used during your research. You have already referred to these papers in your text. The list of references can be built up in two ways: alphabetically (based on the surname of the 1st author) or by number. The format you choose will influence the way in which you use references in the text.

Alphabetically:

In the text of your report, mention the surname of the 1st author and year of publication after a conclusion based on a paper. If a report has been written by more than one person, write (in italics!) *et.al.*.

Example: Ovaries taken from homozygote AMH *null* mice contain fewer primordial and more growing follicles than the control ovaries (Durlinger *et.al.*, 1999).

If this concerns a review, please mention this in your text.

Example: Members of the TGF β super family transmit signals via transmembrane serine/threonine kinase type I and II receptors (reviewed by Miyazono *et.al.*, 2001).

Papers in the reference list can be listed in various ways. For all the possibilities, consult articles with similar reference lists. The following is frequently used:

Surname author initials author, surname author initials author,etc.... and surname author initials author. Year of publication. Title of magazine (often abbreviated) volume (issue): start page-end page.

van Rooij IA, Broekmans FJ, Scheffer GJ, Looman CW, Habbema JD, de Jong FH, Fauser BJ, Themmen AP, Te Velde ER. 2005. Serum antimullerian hormone levels best reflect the reproductive decline with age in normal women with proven fertility: A longitudinal study. *Fertil Steril.* 83(4):979-87.

Number:

In the text of your report, now all you will have to mention after the conclusion drawn from a paper is a number. The number assigned to a paper is the order in which the paper appears in your report for the first time.

Example: Ovaries of homozygote AMH *null* mice contain fewer primordial and more growing follicles than the control ovaries (1).

Papers in the reference list are listed in order of numbering:

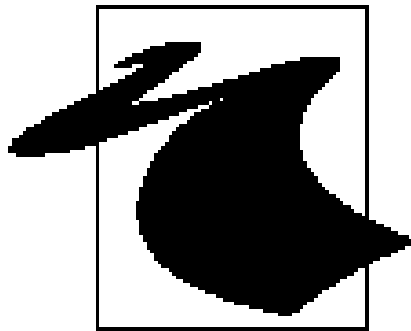
1. van Rooij IA, Broekmans FJ, Scheffer GJ, Looman CW, Habbema JD, de Jong FH, Fauser BJ, Themmen AP, Te Velde ER. 2005. Serum antimullerian hormone levels best reflect the reproductive decline with age in normal women with proven fertility: A longitudinal study. *Fertil Steril.* 83(4):979-87.

Tip:

- There are software programs (i.e. endnote) that will automatically create references in texts and reference lists (in part). Ask someone at your host institution about this.
- Use alphabetical numbers if you are compiling your reference list by hand. If you are using numbering, you may have to adjust the entire list if you chose to insert a new source article.

Appendix VI

Evaluation of bachelor degree level



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Beoordeling van eindniveau bachelor Bio-informatica (ENG)

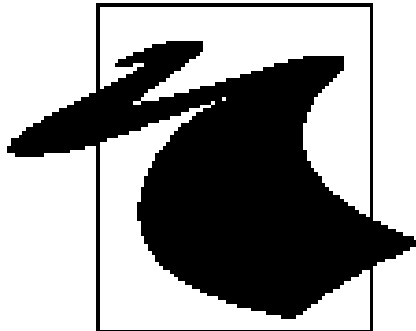
Afstudeerder: _____

Assessor: _____

Examinator: _____

Afstudeerbegeleider: _____

Datum: _____



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Appendix VI: Evaluation Bachelor Level

<i>The student can complete an assignment from the professional field of bioinformatics independently and/or within a multidisciplinary team</i>			
The assignment, as described in the graduation plan, has been completed demonstrably	G	S	U
The assignment was completed as previously agreed and according to expectations	G	S	U
The assignment was completed according to plan, or the deviation has been substantiated	G	S	U
The student has worked on the assignment independently in which:			
• he/she has regularly discussed his/her progress with the thesis supervisor and the team	G	S	U
• he/she was able to answer questions posed by the team about the assignment	G	S	U
• he/she was timely in asking for help from the appropriate people	G	S	U
• he/she checked the execution of the assignment's planning and adjusted it where necessary			
Comments	G	S	U
Final evaluation	G	S	U

Appendix VI: Evaluation Bachelor Level

<i>The student can approach an assignment on a project basis by working in a solution-oriented manner, is able to collect the required information from recent (scientific) sources and can discuss the results within a multidisciplinary team</i>			
Investigative capacities: in analysis and solution, relevant information is found and critically evaluated	G	S	U
Analytical capacities: in analysis and solution, collected data are systematically organised and interpreted	G	S	U
Conceptual capacities: in analysis and solution, the student makes use of relevant, current and adequate professional expertise	G	S	U
Assessment capacities: in analysis and solution, previously compiled criteria and rational assumptions are made use of	G	S	U
Goal-oriented: the student persists until the result has been attained; he/she assigns priorities and distributes available time efficiently across tasks; can find a balance between ambition and reality and between quality and feasibility	G	S	U
Problem-solving capacities: He/she contributes workable solutions and assigns them a credible feasibility and risk analysis; monitors solutions actually being carried out	G	S	U
Efficiency: Results are attained with the least possible effort and means; the costs are in proportion to the benefits	G	S	U
The student has made use of at least 10 scientific papers in the compilation of his thesis. The papers were used to examine the thesis subject in the (biological) framework, as a means of support and discussion of the results	G	S	U
Remarks:			
Final evaluation	G	S	U

Appendix VI: Evaluation Bachelor Level

<i>The student can function as part of a multidisciplinary team and can communicate with different professionals within the organisation</i>			
The student has presented the results of his/her research within the organisation (i.e. during work consultation) and has answered relevant questions	G	S	U
The student has communicated questions pertaining to the execution of his/her assignment to the relevant professionals and received answers which could subsequently be used to execute the assignment	G	S	U
The student functions as part of the team, has adequate contact with the team's members (also about issues not directly related to the work), participates in social events (coffee breaks, lunch etc) that are normal within the professional organisation	G	S	U
The student asks for and gives feedback about his/her performance. The feedback is assimilated and the performance is improved as a result.	G	S	U
Remarks:			
Final evaluation	G	S	U

<i>The student can store his data and make this data available to professionals within and outside the organisation</i>			
The student has submitted the data files and research results accompanied by oral and written explanation to his/her thesis supervisor	G	S	U
The data files and research results have been filed in a well-organised manner and can be used directly by professionals within the organisation This means that, if required, manuals and scripts have also been compiled and adequate comments have been incorporated in the scripts	G	S	U
The student has provided answers to questions posed by professionals within the organisation about the use of scripts and the insights gained from research	G	S	U
The student has written the report in English (not obligatory)	G	S	U
Remarks:			
Final evaluation	G	S	U

Appendix VI: Evaluation Bachelor Level

<i>The student can describe results in a paper comprising an introduction, materials and methods, results and discussion; in conformity with the scientific requirements from the field of profession to which the report has been geared</i>			
The thesis includes a Summary, Introduction, Materials & Methods, Results, Discussion and Reference list, in which the appropriate content has been described in the relevant sections (in conformity with scientific requirements)	G	S	U
The text of the thesis report is easy to read <i>The text can be understood at first reading; there are few questions as to its clarity</i>	G	S	U
The text of the thesis has been presented in a convincing manner <i>Argumentation has been substantiated convincingly; it is consistent and complete; use was made of authoritative sources</i>	G	S	U
Spelling, grammar and lay-out were adequate in both papers	G	S	U
De student has written the report in English (not obligatory)	G	S	U
Remarks:			
Final evaluation	G	S	U

Appendix VI: Evaluation Bachelor Level

<i>The student can present results independently to lecturers at the bio-informatics department and interested parties from the field, and can answer questions concerning his work</i>			
Accessibility: the student uses professional jargon correctly and his text has been geared towards the intended target group, is to the point, does not digress, makes use of examples that are easy to remember, speaks easily and without too much hesitation, can easily be understood, keeps pace well, speaks enthusiastically and energetically	G	S	U
Sensitivity: student is emphatic: forms a reliable picture of what others mean to say, understands the body language of others, tries to understand others, listens actively, reacts to others with understanding for their motives and position even if he or she does not agree with these, checks to find out if he or she has come across as intended: summarises; poses questions; invites reactions; speaks with respect about clients, colleagues, the organisation; treats others with respect; does not attack others and does not offend them; does not need to score highly at the cost of others	G	S	U
Persuasiveness: student substantiates his/her points of view with arguments. The argumentation is consistent and complete: no contradictions or gaps in speech, body language corresponds to what is being said, shows personal involvement, is willing to answer critical questions, does not reply defensively, asks for arguments	G	S	U
The organisation of the presentation is logical, clear and reflects the thesis subject adequately	G	S	U
Comments			
Final evaluation	G	S	U