GRADUATION PROJECT MANUAL 2023-2024

ICT & CT Information Technology Bachelor Emmen

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TABLE OF CONTENTS

1. Objectives and Prerequisite

The programmes provided by the School of ICT & CT of NHL Stenden University of Applied Sciences Emmen are concluded with a graduation project that is carried out individually. During this project the students work on a problem taken from professional practice for which no solution has yet been found. By successfully completing their graduation project the students demonstrate their ability to function on the level of a novice Bachelor of higher vocational education.

Although the students finalise their studies with a graduation project, their graduation project will not be representative of all exit qualifications. The exit qualifications that students can demonstrate to have mastered during their graduation project depend on the nature of the host company and the nature of the graduation project. The graduation project is, however, essential for completing the study programme: the students demonstrate that they can independently solve a problem or answer a question from the professional field through knowledge, skills and attitudes gained in preceding years.

It is generally the first time that students conduct such lengthy research by themselves and report on the research verbally and in writing. The importance of their graduation project therefore lies in working independently and in integrating the knowledge and skills they have already acquired.

The various forms that are used can be found on: **Blackboard -> ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Graduation Bachelor.**

The submission location for the graduation report can be found on: **Blackboard -> ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Graduation Bachelor -> Graduation report check.**

The document *The (preliminary) stage of a graduation project* is **part of the graduation project manual**. Regulations etc. mentioned herein are generally applicable.. This document can be found on: **Blackboard -> ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Graduation Bachelor -> The (preliminary) stage of a graduation project.**

Important address details can be found at the back of this graduation manual in Appendix A.

1.1 Objectives

The objective of the graduation project is:
To give students the opportunity to demonstrate that they have the ability to function on the level of a novice Bachelor IT of higher vocational education.

The level of a higher vocational education Bachelor's degree is described in the Dublin Descriptors, listed in Table 1 on the next page. The level of professional knowledge and skills to be achieved can be found in the Teaching and Examination Regulations (TER) of the degree programme.

Students whom the graduation agency approves on behalf of the examination committee for their graduation project, are expected to have the ability to:

- Formulate and plan their graduation project in collaboration with the client but under their own responsibility;
- Carry out their project independently. Help provided by their immediate surroundings is not ruled out, but the students bear primary responsibility for the project being carried out;
- Comprehensively summarise the results in a graduation report (also see Chapter 4: Reporting);
- Give a 30-minute presentation to interested parties on the main lines of the research;

- Defend the results after the presentation.

Dublin Descriptor	Bachelor's qualifications
Knowledge and understanding	The (future) bachelor: • Has *demonstrable knowledge*, understanding and skills in a field of study, building on the preceding level; • Generally performs on a level that requires knowledge of the latest developments in the field of study, supported by *specialist literature.*
Applying knowledge and understanding	The (future) bachelor has the ability to apply said knowledge, understanding and skills so as to perform on a professional level. More specifically: • *Professionalism* is evidenced by a methodical, project-based and/or problem-driven approach, whilst solutions to issues are viewed from several professional perspectives; • *Reasoning* is evidenced by a logical structure (cause & effect chain) in recognisable steps when formulating a line of reasoning; • *Solving problems* is evidenced by the level of creativity, the feasibility of solutions and the choice of alternatives.
Formation of judgement	The (future) bachelor has the ability to collect and interpret relevant data and from that data form an opinion that is also based on social and ethical considerations. More specifically: • *Data* is collected in a purposeful fashion with a view to the goal, completeness and a balanced distribution; • *Interpreting* is evidenced when the (future) bachelor processes the collected data and can explain the importance of the data; • *Formation of a judgement* is ultimately evidenced by the opinion that is formed on the basis of the data and which can be deduced logically from the data. The afore-mentioned considerations recur explicitly and consistently.
Communication	The (future) bachelor has the ability to: • *Communicate* about information, ideas and solutions with *specialists and non-specialists.* This is evidenced, among other things, by the extent to which findings, ideas and solutions are translated into understandable, logical terms and into a logical and coherent argument; • *Cooperate* with others in a *multidisciplinary and/or international* environment, meeting the requirements of participating in an organisation.
Learning skills	The (future) bachelor's learning skills are sufficient for taking a post-graduate course with a high level of self-sufficiency. The (future) bachelor's skills are sufficient to carry out the graduation project with a reasonable amount of self-sufficiency and within a short-term time frame. *(Learning)*

Table 1: Dublin Descriptors

1.2 Prerequisite

Students must have obtained:

- Their propaedeutic certificate;
- At least 138 EC credits in the main phase.

2. The graduation project

2.1 Criteria

A good graduation project meets the following criteria:

1. Contents:
   - The subject of the project is consistent with the content of the programme.
   - The project has sufficient depth and degree of difficulty appropriate to the level of an bachelor.
   - The project must contain a research component (what does the client need, is it technically feasible, etc.).
   - The result of the project is relevant to the company (technically and/or operationally).
   - The project is sufficiently broad and is anchored in the company's operations.
   - The project gives the study programme the opportunity to evaluate and assess the quality and performance of the student.
   - The volume is enough to work on for at least 90 days.

2. Learning opportunities:
   - The project gives the student opportunities for learning methods and techniques in his professional field that are relevant to actual practice.
   - The project contains a sufficient amount of new and/or in-depth aspects for the student.

3. Supervision:
   - Relevant technical supervision of at least higher vocational education level in the specific field of expertise is provided.
   - The supervisor has the time and opportunities to supervise.
   - The supervisor has at least 3 years work experience in the field of study and is an graduated bachelor or master in the field of IT.
   - It is clear to whom the student is accountable in the company.

4. Resources:
   - The student has his/her own workplace in the organisation with adequate facilities (desk, PC, communication facilities).
   - Sufficient resources are available to carry out the project (laboratory facilities, equipment, software, and the like).
   - Insofar as is necessary, a budget is available to make necessary purchases (software, hardware, materials, etc.).

5. General:
   - **The organisation where the graduation assignment is carried out must sign the NHL-Stenden graduation agreement. If the organisation does not want to sign this agreement, it is not allowed to graduate in this organisation. So ask in advance whether the organisation wants to sign the agreement which can be found on Blackboard.**
   - The graduating student's field of study has, for a good while already, been the main task of the organisation (or department in the organisation) in which the graduation project is carried out.
   - The programme considers it essential that the graduation project is carried out in a different organisation than the one where the student did his/her internship.
   - The project must be formulated by the organisation.
   - The student works 5 days a week for the organiSation at the work location and working from home is not allowed.

2.2 Organisation

1. Graduation projects are determined per programme by the relevant examiners in consultation with the candidates. Graduation projects are established by describing objectives and deliverables. The result is a graduation report that describes the research and the activities. The result must also be presented and defended in a graduation colloquium.

2. Graduation projects can be carried out by one student.

3. Students must meet the graduation admission requirements as specified in the Teaching and Examination Regulations. The following procedure applies to determine whether a student meets the graduation admission requirements:
   The graduation agency checks on behalf of the examination committee and on the basis of the recorded study progress whether the student meets the requirements. This check takes place when the student submits the graduation agreement (form **03_GraduationAgreement**) for signature. **The graduation agreement is only signed by the team leader if all requirements have been met.**

   - If so, the student is notified that his/her application has been accepted.

     Without this notification of acceptance and the graduation agreement signed by all parties, it is not permitted to start the graduation assignment.

4. Students, businesses and institutions may submit project proposals. These proposals must be submitted to the graduation agency by 15 January (graduating in semesters 3 and 4) or 15 June (graduating in semesters 1 and 2) respectively. In special cases it is possible to deviate from these dates. The graduation agency assesses, together with the graduation coordinator and graduation lecturers, the suitability of the projects and decides on the allocation of the graduation projects.
   The formulation of the graduation projects is finalised in a dialogue between students and the lecturer/host company supervisors.

5. The scope of the graduation project is 30 ECs. As a guideline, the graduation project comprises a minimum duration of 90 working days.

6. The depth and level of the project is to correspond with what may be expected of a graduate technical higher vocational education student; this level is set down in the Dublin Descriptors. The level of professional knowledge and skills to be achieved can be found in the Teaching and Examination Regulations (TER) of the degree programme.

7. The graduation project is to enable the student to demonstrate amongst other things that he/she has the ability to:
   - Take initiatives;
   - Approach problems systematically and analytically;
   - Work well with people at all levels;
   - Assume responsibility;
   - Sort out the results and draw conclusions from them;
   - Properly describe the course and the results of the project, both in writing and verbally.

2.3 Implementation

1. Information on the project is recorded on standard forms which can be found on **Blackboard**; follow the path **ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Graduation Bachelor -> Graduation forms student.** Form **01_DescriptionGraduationProject** is to be approved by the graduation agency before the start of the project.

2. The students basically work independently and are in charge of their project. They are responsible for:
   - Promptly formulating and submitting the agreed project by e-mail (Form **01_DescriptionGraduationProject)**;
   - Submitting form **02_GraduationNotificationForm** by e-mail to the graduation agency within one week of the start of the graduation project.
   - Signing form **03_GraduationAgreement** in triplicate within one week after the start of the graduation project and making sure that student, host company and graduation agency each receive one copy.
   - The execution of the graduation project must meet the requirements as described in the Vision on Graduation **(Appendix B)**. Submitting a project plan (Gannt chart included) (see Vision on Graduation) to the graduation lecturer within 14 days after the start of the project; The student chairs the meeting during the graduation visit as described in the **Vision on Graduation**;
   - Acquiring literature and documentation;
   - Consulting with their supervisors;
   - Promptly submitting monthly reports (Form **04_GraduationMonthlyReport**);
   - Submitting the graduation report.

   The monthly reports must be sent to the graduation lecturer and company supervisor by e-mail.

3. A graduation report that meets the requirements of a good report is to be drawn up on the project (see Section 2. 4). The graduation report is largely to be written by the student himself/herself and is to provide (technically skilled) outsiders an insight into the work that was carried out in a quick and professional manner.
4. A provisional graduation report (**signed and approved by the host company supervisor**) is to be submitted to the supervisor of the School of ICT & CT of NHL Stenden University of Applied Sciences Emmen **via e-mail and in docx format**, preferably four weeks before the graduation colloquium. This deadline may be changed in consultation with the graduation supervisor, provided that the deadline is never under three weeks. The quality of the provisional report determines whether or not the colloquium can be scheduled.

5. A date for the graduation colloquium is set in consultation with the host company supervisor, the graduation supervisor and the administration of the School of ICT & CT of NHL Stenden University of Applied Sciences Emmen; this colloquium is to take place no later than 20 working days after the graduation activities end. Consult with the graduation lecturers and the host company supervisor regarding the date of the graduation session. Subsequently notify the graduation agency (graduation.ict-ct-emmen@nhlstenden.com) of the date. The graduation agency will arrange with the student whatever else needs to be done to finalise the graduation project. At the same time the completed **05_AdditionalInformationGraduationProject** form containing the details for the colloquium are sent by e-mail to the graduation agency (graduation.ict-ct-emmen@nhlstenden.com).

6. The student must submit the graduation documents to the graduation agency of the School of ICT & CT of NHL Stenden University of Applied Sciences Emmen at least 1 week before the graduation

colloquium.
The graduation documents are:

- One copy of the graduation report via Blackboard (Gradution report check);
- One digital file with the graduation report with apendices in PDF format; **(In addition, the student must send this file to both graduation lectures.)**
- Higher vocational education knowledge bank form (form **06_HBO_kennisbank_registration_form**);
- Higher vocational education knowledge bank consent form (Form **07_HBO_kennisbank_Permission_form**).

The higher vocational education knowledge bank forms can be found on **Blackboard -> ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Graduation Bachelor -> Graduation forms student.**

7. The student present and defend the results of the graduation project in a colloquium in the building of the School of ICT & CT of NHL Stenden University of Applied Sciences Emmen. In principle, this colloquium is a public colloquium. The duration of the colloquium is approximately one hour As a guideline, the duration of the presentation itself is about 30 minutes. During the defence only questions pertaining to the graduation project and the related presentation may be asked.

2.4 Reporting

The report (12,000 - 16,000 words, excluding appendices) may be written in consultation with the host company supervisor and in line with a report structure as is customarily used in the organisation where the graduation project is carried out.

A general report structure is provided below.

The structure of the report is:

1. Front page
2. English summary
3. Table of contents
4. General introduction
5. Objective, problem definition, etc.
6. Research
7. Realisation/Results
8. Discussion and conclusions
9. Suggestions for further research
10. Literature
11. Appendices

In addition to the report, the following **must be submitted in a separate document**:

12. Evaluation and reflection

The following are a few explanatory remarks on the structure: ·

Re 1 The title should be short and informative and allude to the contents. Therefore, choose the title carefully.

Re 2 The summary, which is written in English, is a brief and concise excerpt of the report. It is a very short version of what was done, why it was done, how it was done and especially what the main results and conclusions are. The purpose of the summary is therefore to briefly describe the project and the results of the research. The summary provides the reader a quick insight into the report.

Re 4 A general introduction can contain:

- A description of the project;
- A description of the student's work situation;
- The mission of the group or department to which the student belongs in the organisation;
- Definitions and/or description of some jargon;
- Objective(s).

Re 5 A precisely defined description of the graduation project is provided, either in the form of a problem definition or otherwise, on the basis of a problem analysis.

Re 6 Based on a clear main question and 3 to 4 sub-questions, the research is described sufficiently critically and concluded with a conclusion/summary. This critical description is about the content but also about the methods of research.

Re 7 Description of the activities, including: calculations, working drawings and applications.

Re 8 Discussion and conclusions; the results are recapitulated. Moreover, it is established whether the purpose of the graduation project has been achieved and possible suggestions are made for future research or follow-up actions.

Re 10 Consulted literature is listed according to certain rules, i.e., the APA guidelines. More information about the APA guidelines can be found on the Stenden website.

Re 11 Appendices
It is advisable to include the original graduation project as an appendix. Matters that make the text seriously difficult to read should be included as appendices. Examples are long tables and diagrams. Appendices should be numbered consecutively, have a title and be referred to in the text.

Note! Use formal vocabulary. Avoid words like "we", "us", "wish," "went" and such

Note! Always refer in the text to the figures/graphs and tables in the report. They serve to support text: readers must be able to immediately understand what is meant. All tables and figures should be numbered and have a title; as a header for tables, as a caption for figures. They are numbered individually.

Note! For more information on writing reports, read the book entitled Wat is onderzoek: Verhoeven, N (2018), 6e druk, Boom uitgevers. ISBN: 9789024406937

Note! If the graduation report has not been checked by the lecturer within the checking periods, the student can contact the team leader year 3 & 4 immediately after the checking period has expired.

2.5 Writing centre

The Writing Centre at the mediatheek will be open from September the 1st at the library to assist you when:

- Doing desk research, literature research, literary source citations.
- Writing reports, executive summaries, internship and theses reports.

Visiting hourd at the mediatheek:

- Tuesdays morning 9.00-12.00.
- Thursdays morning 9.00-12.00.

You will have *individual* appointments to assist you when developing your writing skills in Dutch or English by acknowledged experts on the matter.

2.6 Job description of graduation lecturer

The job description of the graduation lecturer can be found on: **Blackboard -> ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Algemeen / General -> Taakomschrijving afstudeerdocent / Job description graduation lecturer.**

2.7 Job description of the graduation coordinator

The job description of the graduation coordinator can be found on: **Blackboard -> ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Algemeen / General -> Taakomschrijving stage- en afstudeercoördinator / Job description work placement and graduation coordinator.**

3. Assessment an completion study

The objective of the graduation projects is: *To give students the opportunity to demonstrate that they have the ability to function on the level of a novice Bachelor of higher vocational education in the field of IT.*

This objective is operationalised in the following sub-objectives:

The student has the ability to:

- Analyse a problem on the basis of an assignment and on that basis formulate objectives and a problem definition;
- Make a reasoned choice of methods and techniques to be used;
- Collect and interpret relevant data and thus arrive at an answer to the problem;
- Record the results of the work in a report that meets appropriate requirements;
- Present the results of the work to an audience of specialists and non-specialists and defend those results;

This is supplemented with specific objectives of the competence matrix you can find in the TER.

The criteria for assessing the graduation report, the presentation and the defence can be found on: **Blackboard -> ICT Stage en Afstuderen / IT Placement and Graduation -> Content -> Graduation Bachelor -> Forms for assessing reports and presentations.**

3.1 General

1. The following is taken into account when assessing the work:
   - The degree of complexity of the project;
   - The amount of help provided by the supervisor(s) and/or company or institution;
   - The total effort demonstrated by the student.

2. The graduation project is given one mark that is rounded off to the nearest decimal.

3. Prior to the colloquium the supervisor completes an evaluation form (host company supervisor feedback form) on behalf of the organisation hosting the graduation project. This form (which the student can find on Blackboard) is sent from the School of ICT & CT of NHL Stenden University of Applied Sciences Emmen to the host company supervisor.

4. Three aspects are considered when determining the final mark of the graduation project:
   - The quality of the work (the graduation process), based on the opinion of the host company supervisor;
   - The quality of the result, as reported in the final graduation report;
   - The quality of the presentation and the defence.

5. The marks as mentioned in Article 3.3 are determined in camera by the supervisors of the School of ICT & CT of NHL Stenden University of Applied Sciences Emmen, if possible in the presence of the host company supervisor(s) and after written consultation with external experts insofar as they were involved in the supervision. One final mark (rounded off to a whole mark) is determined on the basis of these three assessments.

3.2 Testing and second attempt regulations for graduating

In order to graduate, all three components (project activities, graduation report and graduation presentation) are to be assessed as being satisfactory.

The ***provisional graduation report*** must be submitted to the first graduation lecturer no later than the last week of the project. The student receives feedback on the provisional graduation report from the first graduation lecturer within one week.

The ***final graduation report*** (first attempt) is to be handed in no later than two weeks after submitting the ***provisional graduation report***. The student will be informed no later than 2 days before the final presentation whether the final graduation report is sufficient or unsatisfactory.

The student has to give his/her graduation presentation (first attempt) within two working weeks after handing in his/her final graduation report. Should the student decide not to give a graduation presentation within that period of two weeks, the graduation presentation is awarded 1 out of 10.

In the event the final graduation report is given an Unsatisfactory mark, the student has the right to rewrite the final graduation report once (second attempt). The student receives feedback by way of the assessment form which is used to assess the final graduation report. This second attempt for the final graduation report must be submitted within four working weeks after the first attempt was assessed. If the student misses this deadline, the final graduation report is awarded 1 out of 10.

In the event the graduation presentation is given an Unsatisfactory mark, the student has the right to give the graduation presentation one more time. This second attempt at giving the graduation presentation must be held within four working weeks after the first attempt. If the student misses this deadline, the final graduation report is awarded 1 out of 10.

If the project activities are given an Unsatisfactory mark, the student is granted a second chance by way of carrying out a new graduation project.

Should the student receive a Fail mark for one or more graduation components after the above deadlines, the student must carry out an entirely new graduation project.

3.3 Completion study

If the student has obtained **all** the credits from the main phase of the study program and the student is in of the propaedeutic phase, the student can apply for the Final Examination Certificate (= diploma) from the examination board. The student can find out how to do this at: **Blackboard -> ICT Informtica algemeen/general -> algemeen/general -> deregister after graduation.**

Appendix A: Contact information

General address details:

Stenden University of Applied Sciences, Emmen site

PO Box 2080	Van Schaikweg 94
7801 CB Emmen	7811 KL Emmen

E-mail addresses:

M. Baron	marcel.baron@nhlstenden.com
J. Berghout	jaqueline.berghout@nhlstenden.com
R. Blankestijn	raymond.blankestijn@nhlstenden.com
M. Braamhaar	marga.braamhaar@nhlstenden.com
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E. Siersema	elise.siersema@nhlstenden.com
W. van Schilt	winnie.van.schilt@nhlstenden.com
R. Smit	rob.smit@nhlstenden.com
H. Vermue	hanneke.vermue@nhlstenden.com

Graduation coordinator:

B. Meijerink	bert.meijerink@nhlstenden.com

Graduation agency ICT & CT (room 1.026, Telephone: 06-51360140):

M. Braamhaar	graduation.ict-ct-emmen@nhlstenden.com

Appendix B: Vision on graduation Information Technology Emmen

This document conveys 's vision on graduation from the ICT & CT of NHL Stenden University of Applied Sciences Emmen programmes.

The graduation project **must** always be structured around the Software Development Life Cycle (SDLC) as contained in Appendix A.

To avoid any misunderstanding, this document refers to a graduation report (not to a thesis).

The graduation project must be approved in advance by the graduation coordinator and at least one of the other graduation lecturers. The student bears co-responsibility for keeping an eye on the quality of the graduation project. Consequently, all parties involved must be notified promptly of any changes/alterations that might occur during the course of the graduation project. These changes must always be agreed to by the graduation lecturer.

B1.1 The graduation project

Graduation projects concern one project consisting of:

- one part research; The research results are for the benefit of developing software or hardware. The research is part of the Analysis within the SDLC.
- one part development.

The following applies to the graduation report of a graduation project:

- The research is to be described in the main text of the graduation report and not in a separate research report;
- The process and the product must be described in the main text of the graduation report;
- The original graduation project description is to be included in an appendix;
- The original planning is to be included in an appendix;
- The project plan is to be included in an appendix;

The FO/SRS/PRS is to be included in an appendix The FO is to contain at least the class diagram and optionally UML-diagrams, sequence diagrams, activities diagrams and use cases.

B1.2 Additional rules for graduating

B1.2.1 Submit within 2 weeks

The student **must** have submitted the following components to the graduation lecturer within 2 weeks after the start of the graduation project:

- The research proposal consisting of the components that can be found in the example as contained in Appendix D;
- The project plan (including planning) regarding the entire graduation project.

B1.2.2 Graduation visit by the graduation lecturer

During the graduation visit the student leads the discussion (approximately 30 minutes). During this meeting the student elucidates the planning and explains the process/path of the graduation project.

B1.3 Competencies ensuring during graduation

Students at higher vocational education must be able to demonstrate in their study that they possess certain competencies. The ICT & CT of NHL Stenden University of Applied Sciences Emmen program has made, on the base of the hbo-I competence matrix, its own competence matrix for each graduation

profile. A large number of competencies are achieved during the path to graduation, but a number of competencies must be achieved during the graduation (Teaching and Examination Regulations).

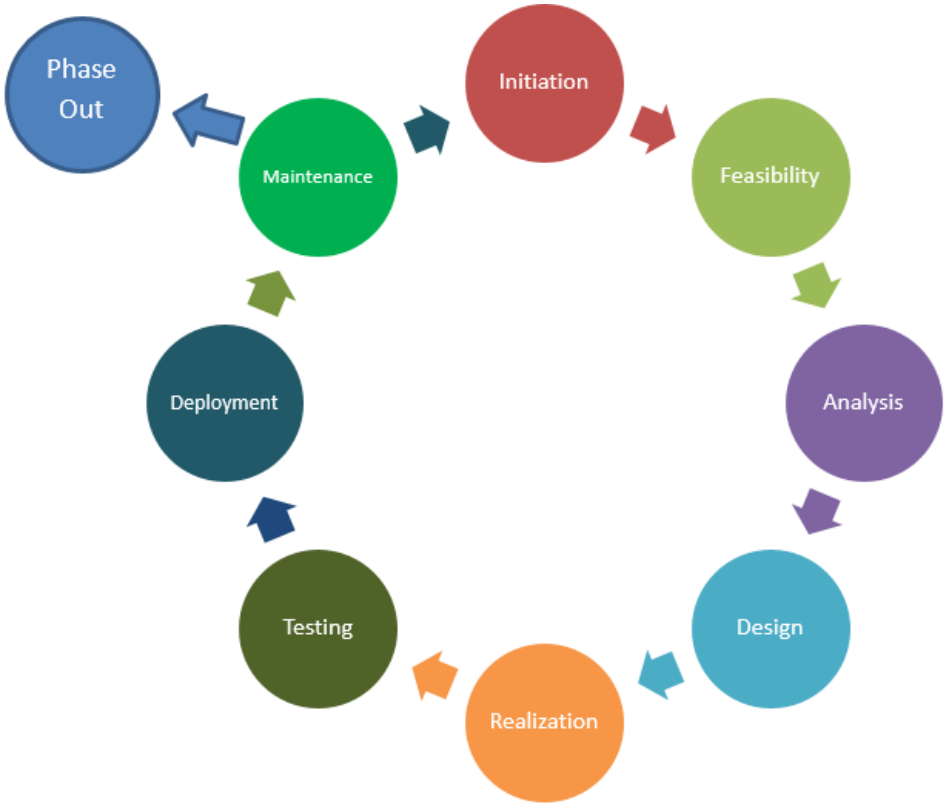
The student must ensure that he / she obtains the required competencies, which have been prepared by specialization, during his or her graduation. The student is therefore responsible to make / formulate an assignment in which the student can prove that he / she achieve these competencies actually and can achieve them during his or her graduation. In Appendix E can be found which competencies must be ach achieved during graduation.

So be aware when choosing a graduation project that it is possible to achieve the competencies. If this is not possible then the graduation project is **not appropriate**.

In addition to the competencies to be ensured, the assignment must be in line with the specialization of his or her graduation. If this is not the case then the graduation project is **not appropriate**.

Appendix C: Software development life cycle

The Software Development Life Cycle (SDLC) below is to be used when graduating from the ICT & CT of NHL Stenden University of Applied Sciences Emmen program.



Stages	
Initiation	Idea for new information system
Feasibility	Begin with a preliminary analysis, propose alternative solutions, describe *costs and benefits*, and submit a preliminary plan with recommendations.
Analysis	Systems analysis, *requirements definition*: Define project goals into defined functions and operations of the intended application.
Design	In this stage *desired features and operations are described in detail*, including screen layouts, business rules, process diagrams, pseudocode, and other documentation.
Realization	Development: the real code is written here.
Testing	All the pieces are brought together into a special testing environment, then checked for errors, bugs, and interoperability.
Deployment	This is the final stage of initial development, where the software is put into production and runs actual business.
Maintenance	During the maintenance stage of the SDLC, the system is assessed/evaluated to ensure it does not become obsolete. This is also where changes are made to initial software.
Phase Out	In this stage, plans are developed for discontinuing the use of system information, hardware, and software and making the transition to a new system.

SDLC to be applied to ICT & CT of NHL Stenden University of Applied Sciences Emmen graduation projects.

Appendix D: Research proposal

Research proposal (in Project Plan)	**Remarks**
Introduction	
• reason for the research	
• Objective (objective of the research)	
• Central question and sub-questions	

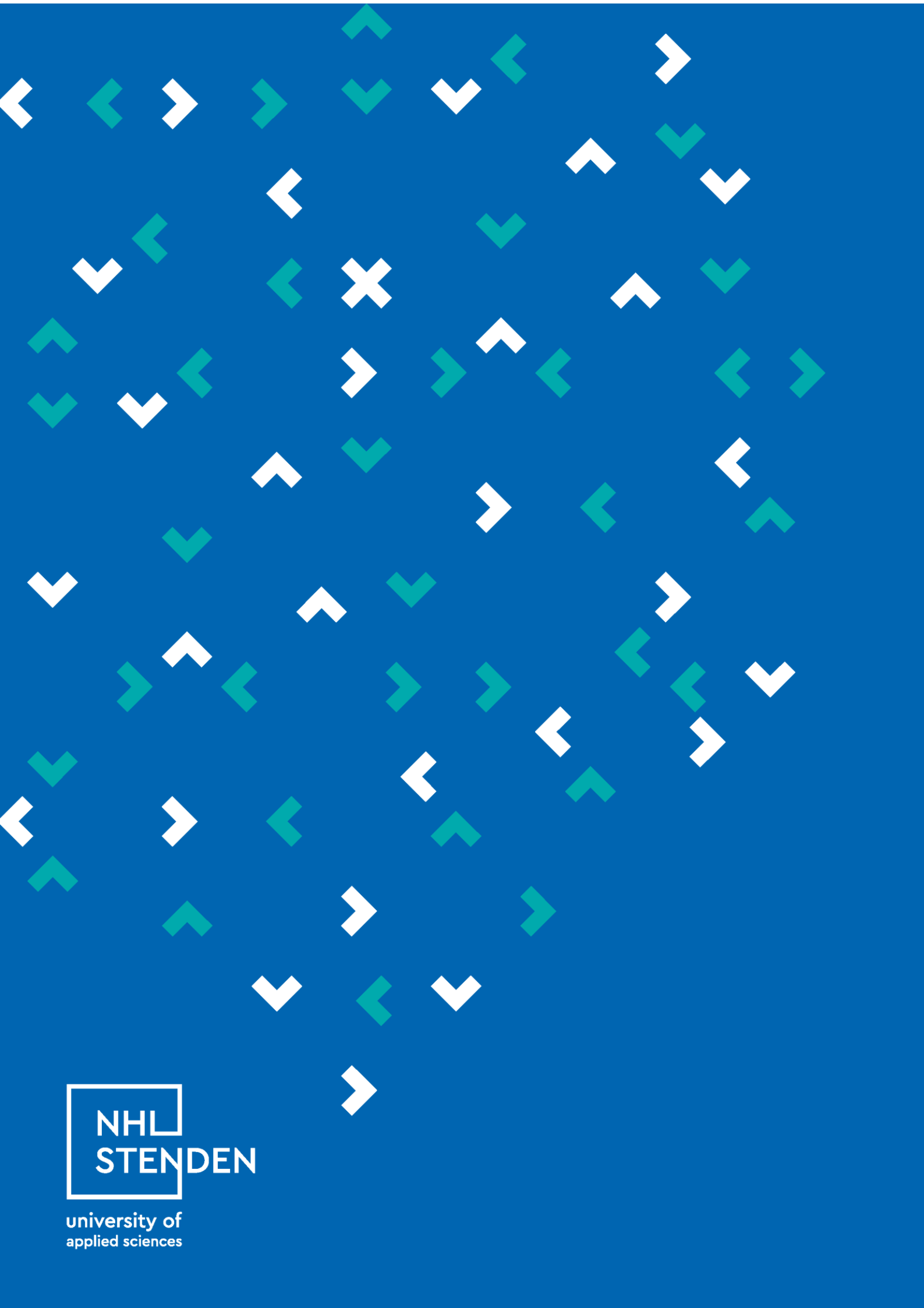
• Theory (Concepts must be explained):
  ○ Clarify concepts in your central question / stipulative definitions
  ○ Used definitions apply to the knowledge base (best practices/ implicit and explicit knowledge)
  ○ Sources within the company or employees	

Research setup	
• design / data collection (research methods) for each sub-question	
• population & sample	
• analysis proposal	
• validity (internal & external) and reliability	
• Usability	
Research tasks (include in the schedule of the project plan)	

Appendix E: Final qualification to achive bachelor Information Technology during graduation

The following competence should be achieved by the (bachelor) student **Information Technology** during graduation:

	Manage & control	Analyse	Advise	Design	Implement
User interaction					
Orginasational processes	• Carry out maintenance activities on the process documentation (for example, business rules, principles and process models). • Describe the change needs of a particular sub-process. ***(level 1)***				
Infrastructure					
Software			• Give advice concerning the choice of software architecture or existing software frameworks whereby cost aspects and quality properties such as availability, performance, security and scalability play a role. • Provide advice about the approach to take during the processing and consultation of large quantities of data with attention for privacy. • Provide advice on the organisation of a software development process, including the test process. ***(level 3)***	• Compile a software architecture for a software system that is comprised of existing and new systems, and takes several stakeholders quality properties into account, including security and scalability. • Compile a test strategy for system tests. ***(level 3)***	
Hardware interfacing					


NHL
STENDEN
university of
applied sciences