B Information Technology
34479

TER 22-23 Bachelor
TOI

Vastgesteld per 1 september 2022
Instemming deelmedezeggenschapsraad (DMR) TOI per 1 september 2022
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PART 1. INTRODUCTION

1. Contents of the TER

These Teaching and Examination Regulations provide students with information about teaching and testing of the B Information Technology (CROHO-number: 34479). In this document, we refer to the Teaching and Examination Regulations as 'the TER'.

The TER also contains the rules that apply to teaching and testing.

The TER concerns teaching in the programme in all forms and variants, for both the September and February intakes.

As well as regular students (further referred to simply as 'students'), higher education programmes can include external students. Enrolment as an external student only entitles the student to take tests, not to attend classes. The TER only applies to students. The provisions relating to testing and examinations also apply to external students.

2. Organisation of this document

We expect students to be familiar with the contents of the TER. That does not mean that everyone has to learn the text by heart, but students who have general questions or problems should first check to see whether the TER can clarify the matter. Students can do a quick check for information by using the table of contents or the index. Note: the index does not indicate every single place where a word or concept is mentioned, but it does point to the place where the definition or key information can be found.

The TER applies to all students, regardless of when they first enrolled. This means that what was written in last year's TER does not automatically apply this year. Changes may have been made. Students who have to repeat or make up a component from a previous year therefore cannot assume that everything will still be the same. It is important to check the content, procedures and rules for this year in good time.

As much as possible, we explain the concepts that we use in this TER within the part of the text that deals with that concept. But we sometimes need to use a concept that we haven't already explained. In that case, you can use the index to find the definition of the concept.

The TER consists of ten parts. Most of these are further divided into chapters. All topics covered by the chapters have a heading in bold. These headings appear in the table of contents. These components (articles) are numbered sequentially, from Article 1 to Article 185.

PART 2. THE EXAMINATION BOARD AND THE TER

3. The Examination Board

The programme has an Examination Board. More information on the Examination Board can be found on Iris.
Chapter 2 of the Education Guide contains a comprehensive explanation of the duties and powers of the Examination Board.

The university believes it is important to have professionally run Examination Boards which:

/ are conscious of their independent and expert task of keeping a 'watchful eye' over the programmes, to ensure they are at an appropriate level of higher professional education;

/ perform their work in accordance with the applicable laws and regulations; and

/ occupy a strong position as an independent advisory body for the faculty director and programme management.

The TER describes the duties and powers of the Examination Board just as they are described in the Dutch Higher Education and Research Act (Wet op het hoger onderwijs en wetenschappelijk onderzoek, or WHW).
In individual cases, the Examination Board may decide to deviate from a rule in this TER.

Students must always submit a request for a deviation. Via this link students can read how and to whom they can submit requests. If there are special or personal circumstances, students should mention these as soon as possible.

The Examination Board handles requests only if they are submitted within the specified timeframe. If no timeframe is specified, students may submit requests at any time. Requests should be submitted as soon as possible. The Examination Board needs time to properly consider requests.

The Examination Board will specify the requirements that requests must meet and the supporting documents that must be included with requests.

For some matters, the TER specifies a timeframe within which an Examination Board will make its decision. The timeframe is expressed in working days. 'Working day' means any day from Monday up to and including Friday. The following days are not working days:

- public holidays set by the government;
- days on which the university is closed, as specified in the annual calendar.

For other requests and complaints, the decision-making timeframe is specified in the digital form which students must use to submit their request or complaint.

If a request is incomplete or was not submitted in the correct manner, the timeframe will start to run only when:

- the request has been correctly submitted;
- and the student has supplied all necessary information.

4. Disagreeing with a decision made under the TER

In Chapter 2 of this Education Guide and on Iris, under Knowing & Arranging, Objection and Appeal, students can find a list of decisions by the Examination Board, an examiner or the faculty director, against which a student can lodge an appeal or objection. It is also explained what 'objection' and 'appeal' mean and what the procedure is.

For all decisions that are subject to objection or appeal, the process and timeframes for submitting an objection or appeal are specified.

PART 3. TEACHING

Chapter 1. Objectives and professions for which students are trained

5. Objectives, professional requirements and degree

The programme trains students to develop initial ability into professionalism. The programme has been set up in such a manner that the students can achieve the objectives with regard to knowledge, attitude, understanding and skills. Hereinafter, we refer to these four attributes as ‘final qualifications’.

On receipt of the degree certificate, the degree for the Bachelor of Science programme will be awarded to the student.

The Information Technology degree programme aims to train students in a broad sense. At the same time, it focuses on a number of specific professional profiles:

Software Engineering

A software engineer designs and builds applications, and creates and tests software. Crucially, the software engineer should collaborate with the customer and colleagues so as to deliver a complete and coherent product that meets all requirements. Focal points include:

App Development

An app developer designs, creates, tests and maintains apps. Apps are pieces of software for a smartphone, table ot other device.

Cloud development

As a cloud applications engineer, you are part of a team that builds a software platform to provide users with a fully scalable service for data management, processing and storage.

Security

The security specialist takes care of security measures in computer networks and servers. He/ she develops security plans, offers advice on building and designing information systems and determines security systems specifications.

Game Engineer

As a game engineer you design and realise new games for specific audiences.

User Interface Design

A user interface designer is responsible for the layout and design of applications. He/she ensures that the website looks good, is well -structured and user-friendly. A user interface designer combines a sense of design with technical insight. in addition, he/she is able to translate the client's wishes and requirements into a workable application.

For all profiles, students should be able to implement new ICT systems, redesign existing systems and/ or execute administration tasks on such systems at a professional level.

Chapter 2. Form and structure of the programme

6. Study load

The study load of a programme is expressed in credits. Each credit represents an average of 28 hours of study. These credits are equivalent to the European Credits (ECTS) used in European higher education institutions.

The study load is:

Bachelor’s programme: 240 credits (foundation phase 60 credits, main phase 180 credits).

7. Foundation phase and main phase

The Bachelor's programme is divided into a foundation phase and a main phase.

In the foundation phase, students discover the content of the programme, the profession and what final qualifications are necessary for the programme. The purpose of the foundation phase is orientation, referral and selection. The foundation phase ends with the foundation examination. Students pass the foundation examination if they have completed all units of study of the foundation phase successfully. See also Article 9. Units of study.

The main phase follows after the foundation phase. The main phase ends with the final examination. Students pass the final examination if they have successfully completed all units of study in the main phase.

8. Joint foundation year

The programme does not have a joint foundation examination.

9. Units of study

The programme is divided into units of study. Each unit of study consists of educational activities that:

- aim to help students acquire knowledge, skills, understanding, attitudes and reflection;
- relate to each other and form one entity.

The study load of a unit of study is expressed in whole credits.

A unit of study may be further divided into modules.

A module is a part of a unit of study for which a test applies.

Students complete each unit of study with one or more tests. See also Articles 93. Oral tests and 94. Other types of tests .

Chapter 3. Basic curriculum, specialisation, main subject,

10. Basic curriculum

Every programme has a basic curriculum. This consists of the units of study that are mandatory for all students. In addition to the basic curriculum, students are presented with a range of additional optional subjects.

A Bachelor's programme can have specialisations or main subjects, or both. Programmes can also have different forms and variants.

11. Specialisation

The programme has no specialisation.

12. Main subject

A main subject has a narrower focus than a specialisation. Students take a set of units of study, which:

- are linked to one another;
- relate to a specific profession or discipline or a focus area within a profession or discipline.

Main subjects appear on degree certificates.

The programme has the following main subject: Mobile Development

13. Optional subjects

De program Information Technology offers the following optional subjects:

- Cloud computing
- Mobile development
- Security
- Game Engineering
- User Experience
- Big Data & AI

These optional subjects (minors) are offered in both years 3 and 4. It can be taken within the student's own study program, at one of the professorships within the research group, via "Kies op Maat" at another University of Applied sciences or at another university abroad. A student may take a maximum of 30 ECs of optional subjects (minors) outside the study program. If a student wishes to follow 15 or 30 ECs of optional subjects (minors) outside the study program, he / she must submit a plan to the Examination Board for approval in consultation with his / her study counselor. In this plan, the student must describe how he / she will obtain the competences of the bachelor's degree in Information Technology at the Start Qualified level.

14. Form: full-time, part-time, dual

Programmes are offered in full-time form, in part-time form and/or in dual form.

- With a **full-time programme,** the teaching is arranged so that students spend 1,680 hours per year on their studies, spread over 42 weeks.
- A **part-time programme** is set up so that the studies can fit in with a job, in the evenings or for a few hours in the daytime. Sometimes requirements apply to the job. Students cannot follow a part-time programme if they do not meet these requirements.
- With a **dual programme**, students work during their studies, or during parts of their studies. Their work is part of the programme, the ‘professional component’. Students get credits for this part, provided they get a good evaluation.

The structure of the curriculum and the content of the units of study may differ between the various forms. But the final qualifications (learning outcomes) that students ultimately achieve and the total study load are the same for all forms.

Information Technology is only offered in full-time.

15. Programme variants

Programmes can have different variants. The variants for the B Information Technologyprogramme are:

The programme does not have variants.

The structure of the curriculum and the content of the units of study may differ between the variants, but the final qualifications (learning outcomes) that students ultimately achieve are the same for all variants.

16. Honours programme

The program offers an honors program for students who want to develop into excellent professionals. Excellent professionals, in collaboration with others, come up with innovative solutions that are of practical significance for tackling socially important issues.

For the honours program, the study program selects the participants on the basis of selection criteria that are known in advance.

If the student completes the study program including an honors program, the certificate will state 'Honours Program'. The content of the program is stated in the diploma supplement. A diploma supplement is an English-language document containing the most important information about the study program that the student has completed and the results he has achieved.

<explanation>

17. Additional programmes

The programme does not offer an additional programme.

18. Transition from Bachelor’s to Master’s programmes

Does the Bachelor’s programme have a transition programme for moving on to its own Master’s programme, or to a Master’s associated with another programme or at another institution?

The Bachelor’s programme does not have a transition programme for moving on to its own Master’s programme, or to a Master’s associated with another programme or at another institution.

19. Transition from Ad to Bachelor’s programmes (not applicable to Bachelor's programme)

This Article is not applicable to the Bachelor's programme. The Ad programme has a separate TER.

Chapter 4. Programme structure, content and evaluation

20. Terms and calendar

The academic year comprises four terms, each approximately ten weeks long. There may also be a fifth term, which then runs from mid-July to the end of August.

See attached Schedule

21. Curriculum obsolescence and updating

The programme curriculum is updated regularly. The changes may be minor or major. Minor changes do not result in units of study or modules being renamed.

There will be minor changes to the curriculum for this program in the coming year. The following tests will no longer be included in the 2022-2023 curriculum.

Year	Unit of study	Unit of study code	Test	Test code	Last year in programme	Last year resit
2	Marketing & Social Strategy	1919IN242Z	Rapport Social Strategy Groep	1916IN242A	2021-2022	22/23
2	Marketing & Social Strategy	1919IN242Z	Rapport Individueel Hoofdstuk	1919IN242B	2021-2022	22/23
3	Internship 1	1914IN311Z	Internship start document	1914IN311A	2021-2022	22/23
3	Internship 1	1914IN311Z	Midterm presentation	1914IN311B	2021-2022	22/23
3	Internship 1	1914IN311Z	Midterm Report	1914IN311C	2021-2022	22/23
3	Internship 2	1914IN321Z	Stagerapport stage	1914IN321A	2021-2022	22/23
3	Internship 2	1914IN321Z	End Presentation Internship	1914IN321B	2021-2022	22/23

22. Expiry dates of units of study and modules

Major changes result in the setting of an expiry date. The expiry date is the last date on which the unit of study or module, with the associated test(s), will form part of the programme curriculum.

If a module has an expiry date, the entire unit of study will expire on that date. Modules that are part of that unit of study but are not scheduled to expire will be incorporated into other units of study. The same applies to any test results or exemptions associated with the module. That other unit of study may be an existing unit of study or a new unit of study.

If a module is incorporated into another unit of study, a new weighting of its test will be set for the purpose of determining the final grade for that unit of study. See also Article 127. Grade for a unit of study.

The following tests have an expiration date of August 31, 202.

Year	Unit of study	Unit of study code	Test	Test code	Last year in programme	Last year resit
2	Marketing & Social Strategy	1919IN242Z	Rapport Social Strategy Groep	1916IN242A	2021-2022	22/23
2	Marketing & Social Strategy	1919IN242Z	Rapport Individueel Hoofdstuk	1919IN242B	2021-2022	22/23

3	Internship 1	1914IN311Z	Internship start document	1914IN311A	2021-2022	22/23
3	Internship 1	1914IN311Z	Midterm presentation	1914IN311B	2021-2022	22/23
3	Internship 1	1914IN311Z	Midterm Report	1914IN311C	2021-2022	22/23
3	Internship 2	1914IN321Z	Stagerapport stage	1914IN321A	2021-2022	22/23
3	Internship 2	1914IN321Z	End Presentation Internship	1914IN321B	2021-2022	22/23

23. Expiry date, transition period and validity period

The expiry date will be the last day of an academic year. We will announce the expiry date by no later than the first day of the next academic year. Depending on the timing of the announcement, a transition period may be added to the expiry date, by adding '+1 yr' or '+2 yrs'.

If students have already attended some of the classes for the unit of study that is going to expire, they are entitled to education based on the old programme as preparation for the associated tests, for the duration of the transition period. During that period, they are also entitled to sit the associated tests.

If they do not complete the entire unit of study within the transition period, they will have to attend the replacement classes instead, and sit the replacement tests.

The following tests will no longer be included in the 2022-2023 curriculum. The last resits will take place in 2022-2023 for:

Year	Unit of study	Unit of study code	Test	Test code	Last year in programme	Last year resit
2	Marketing & Social Strategy	1919IN242Z	Rapport Social Strategy Groep	1916IN242A	2021-2022	22/23
2	Marketing & Social Strategy	1919IN242Z	Rapport Individueel Hoofdstuk	1919IN242B	2021-2022	22/23
3	Internship 1	1914IN311Z	Internship start document	1914IN311A	2021-2022	22/23
3	Internship 1	1914IN311Z	Midterm presentation	1914IN311B	2021-2022	22/23
3	Internship 1	1914IN311Z	Midterm Report	1914IN311C	2021-2022	22/23
3	Internship 2	1914IN321Z	Stagerapport stage	1914IN321A	2021-2022	22/23
3	Internship 2	1914IN321Z	End Presentation Internship	1914IN321B	2021-2022	22/23

If an expiry date has an associated transition period, the tested knowledge, understanding or skills may be demonstrably obsolete. If this is the case, it will be stated under the module or unit of study in question.

Students who had already completed this component of the unit of study must bear in mind that their test results will have limited validity. See also Article 146. Limited validity period for tests and exemptions and following.

If students do not succeed in completing the entire programme within the validity period applicable to them, they will have to attend the replacement classes instead, and sit the replacement tests.

24. Evaluation of the programme

The faculty works with two quality cycles whom both consist of four steps of Plan-Do-Act-Check (PDCA).

The 'small'quality cycle focuses on monitoring and improving the results per eduational term or semester. (four or two times per

academic year). After every term the teaching staff as well as the students discuss their analyses and points of improvement.

The 'large' quality cycle focuses on the integration of the different evaluations conducted in one academic year. It integrates the evaluations of the students, workfield, alumni and employees. and gives an overview of all these results.

PART 4. ADMISSION

Chapter 1. Admission to the foundation phase

25. General rules of admission

The rules on admission to the foundation phase are set out in the Rules on enrolment and deregistration of Inholland University of Applied Sciences. This document can be found on the website and on Iris and is briefly discussed in Chapter 2 of this Education Guide. If prescribed by the WHW, these rules are included in the Rules on enrolment and deregistration. This applies at any rate to:

- the entrance examination;
- the examination for persons aged 21 years or older who do not meet the admission requirements (21+ examination);
- the prior education and entrance requirements for students who do not come from a country in the European Economic Area (EEA);
- the requirements for enrolling in a programme that will be partly or entirely taught in the English language.

26. Admission following an interruption in enrolment

Students whose programme was interrupted by deregistration and who wish to re-enrol must ask the programme upon re-enrolment which results they have already achieved and to what extent these fit in with the programme as it applies at the time of re-enrolment.

The programme will let these students know in writing what additional classes and tests they must take to match up with the tests they have passed and which exemptions they have. The students must also comply with the other rules for enrolment and deregistration.

Enrolment for a programme that is being phased out is not possible.

27. Admission to a part-time programme

The programme has no part-time form.

28. Admission to a dual programme and work-study agreements

The programme has no dual form.

Chapter 2. Admission to the main phase

29. Admission to classes and tests in the main phase with a foundation certificate awarded by Inholland

To be admitted to the main phase, students need either a foundation certificate from the programme or a joint foundation phase exam that also applies to the programme. The faculty director may determine in this respect that a student will not be admitted to one or more specialisations or main subjects. More information is provided in Article 38. Exclusion from main subjects or specialisations.

Generally speaking, admission to the main phase means that students are admitted to all units of study and tests. However, for some units of study additional conditions apply before students can take classes or sit tests. Students must meet these conditions before they can take part in those units of study.

Careful thought has been given to the structure of the curriculum and the order of the units of study. However, students are not required to follow this order.

30. Admission to the main phase with a foundation certificate awarded by another institution of higher professional education

If students have a foundation certificate from another institution of higher professional education, the Examination Board will

assess for which units of study they may be offered an exemption or whether they can start the main phase straight away.

The Examination Board will make its decision within 30 working days after receiving a complete request.

31. Admission to main phase classes and tests without a foundation certificate

If the student does not yet have a foundation certificate and has also not met the binding study recommendation standard, they can still attend the units of study in the main phase/the second year. If special conditions apply to participation in a unit of study, students can only attend the unit of study if they meet these conditions.

31.a Entry and transfer requirements for units of study from the second year

In order to participate in the Code Generation Project (2.4), the student must complete the Building applications Project (1.4) sufficiently.

See articles 35 and 36.

Chapter 3. Switching

32. Switching between forms and variants

Switching between forms and variants within a programme is allowed. Students must comply with the conditions for admission and enrolment that apply to the form or variant to which they wish to switch.

The Examination Board will determine how students' test results and exemptions will be incorporated into the form or variant to which they are switching.

33. Switching between programmes with a joint foundation examination

With a joint foundation exam, students are enrolled in one specific programme, and their results are recorded towards that programme.

If students switch to another programme with the same joint foundation exam before completing their foundation phase, they retain their results and exemptions from the foundation programme. These are transferred to the new programme, with the dates on which the results were achieved being maintained.

If students switch programmes after receiving a foundation certificate, no new foundation certificate will be awarded for the new programme.

Any warnings issued as part of the binding study recommendation remain applicable after a switch.

If students have received a binding study recommendation for one of the programmes with a joint foundation exam, they cannot switch to another programme with the same joint foundation exam.

34. Switching between Ad and Bachelor's programmes

Students cannot switch from an Ad programme to the Bachelor's programme.

Chapter 4. Admission to work placements and graduation programmes

35. Work placements

Students require permission from the programme to be able to start a unit of study that includes a work placement component. Permission is granted through the signing of a placement contract by or on behalf of the faculty director.

If other conditions apply to participation in the unit of study, students must meet these as well before they can participate. The programme deals with these conditions with leniency.

In Week 4 of the term prior to the term in which students are due to start their internships, steps will be taken to establish whether or not they have met the conditions for participation in the internship. To be able to start the internship, the following entry requirements must have been met by this reference date:

- A minimum of 90 credits has been attained;
- Passed the Interview and Reporting Test (1918IN131B);
- The projects (group work) that fall in the same term as the internship have been completed successfully.

Students will be able to start their internship in any term, provided they meet all of the entry requirements by Week 4 of the previous term. The reference period for anyone wanting to start an internship in Term 1 is Week 4 of Term 4.

Exception for Term 5

Students who have obtained a minimum of 100 credits by the end of the academic year (term 4) may lodge a request with the committee prior to week 1 of term 5 in which they explain why they want to start their internship in term 1. The placement committee will make a decision in Week 1 of Term 5.

No supervision will be provided in Term 5. This means that the internship will take place in Term 4 and Term 1 of the next academic year if a student starts his internship in Term 4.

36. Graduation programmes

Students require permission from the programme to be able to take a unit of study that is part of a graduation programme. The graduation programme consists of units of study with one or more graduation products.

To start the graduation programme, the following admission requirements apply:

- The propaedeutic phase has been passed
- The 3rd year internship has been successfully completed.
- A minimum of 185 ECs were obtained in week 3 of the period prior to the start of graduation.

Chapter 5. Admission to optional subjects, main subjects and specialisations

37. Optional subjects

In semester 2 of year 3 you can choose between:

- Game Engineering (period 3 and 4)
- User Experience (period 3) and Security (period 4)
- Big Data & AI (period 3 and 4)

In semester 1 of year 4 you can choose between:

- Mobile Development (period 1 and 2)
- Cloud Computing 1 (period 1) and Cloud Computing 2 (period 2)
- Security (period 2)

38. Exclusion from main subjects or specialisations

Students select a main subject and specialisation from the range offered by their programme. However, the faculty director may decide not to allow a student to take a main subject or specialisation, if differences in the nature and content of that main subject or specialisation justify such a decision.

In making the decision, the faculty director takes into consideration the study results, the programme as followed by the student, or both, and the relationship between these and the content of the main subject or specialisation.

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39. Participation in more than one main subject or specialisation

If students wish to participate in more than one main subject or specialisation, they must indicate in advance to the Examination Board for which main subject or specialisation they wish to take the final examination. The choice for one particular graduation track is specified on the certificate. The other choice is extracurricular. This means that this choice is not part of the programme itself. Specialisations are not reported on the certificate. All units of study that the students have successfully completed will be included in the list of grades and the diploma supplement.

Chapter 6. Admission to optional subjects

40. Optional subjects

The programme offers the following options:
- electives Mobile Applications, Cloud and Security (4th year)
- electives Game Engineering, UX, Security and Big Data (3rd year)
The descriptions of the programme's elective units are included at the end of this chapter.

The conditions for participating in the electives are:

- Propedeuse achieved.
- Internship in the third year achieved.

The electives (15 or 30 EC) are offered both in year 3 and year 4. These may be followed as part of our own programme or as part of one of the associated programmes. Students may take at most 30 EC of electives at an associated programme. If students wish to take 30 EC of electives outside of their own programme, they must write a plan in consultation with their study supervisor and submit it to the Examination Board for approval. This plan must explain how the student intends to achieve the competencies of a Bachelor of ICT at the Competent to Start level.

Within our own programme, the major consists of elective units and the individual graduation research which is linked to a complex professional situation. This graduation research must be aligned with the chosen electives. The completed major will be noted in the supplement to the student's diploma.

41. Optional subjects package

The programme does not offer an optional subjects package.

42. Exemption and substitution of optional subjects

Students can request an exemption from the Examination Board if they have taken certain tests as part of another programme. In this case, they must choose an optional subject first and then apply for an exemption. Chapter 18. Exemptions, particularly Article 160. Exemptions procedure and evidence, contains more information about how students can apply for exemptions and the requirement that they must state the reasons why they need an exemption.

Students can also request the Examination Board to grant them permission to take other units of study that allow for national and international mobility. These are known as ‘substitute units of study’, as explained in Article 167. Request for substitution and following Articles.

43. Permission by the Examination Board for optional subjects

If students choose an optional subject that is not offered by their own programme, they must first discuss the choice with their study counsellor.

They must then submit a request to the Examination Board. In the request, they must indicate:

- how the choice aligns with the profile of their programme in terms of final qualifications (learning objectives) and level;
- how the choice relates to the phase of the programme in which they are making the choice;
- how the choice fits in with their personal goals.

The Examination Board will make a decision within fifteen working days.

44. Changing a selected optional subject

Students can change their choice of optional subject at any time up until five weeks at the latest before the start of term. To do so, they must repeat the procedure set out in Articles 42. Exemption and substitution of optional subjects and 43. Permission by the Examination Board for optional subjects.

45. Extra optional subjects

Students can obtain extra credits by taking more optional subjects than provided for in the graduation programme. In this case, they must let the Examination Board know which units of study are extracurricular. These units of study do not form part of the

final examination.

Students who choose to take extra optional subjects are recommended to take note of the provisions of Articles 175. Degree certificate and 177. Deferral of awarding of the degree certificate when deciding on the order in which to complete the optional subjects. These articles determine when a degree certificate will be awarded and when the awarding of the certificate will be postponed.

PART 5. APPLYING FOR UNITS OF STUDY

Chapter 1. Applying for units of study in the basic curriculum

46. Applying for units of study

Students do not need to apply to take units of study in the basic curriculum. However, applications are sometimes necessary for the organisation of the programme, for instance in the case of field trips. Where an application is required, it will be stated in the unit of study description.

Students will be informed as quickly as possible as to whether they can take the units of study for which they have applied. They will receive this information at least two weeks before the unit of study is due to start.

If there are more applicants than places, students will be placed in the order in which they applied. Students for whom the unit of study is an integral part of their basic curriculum will be given preference ahead of students for whom this is not the case.

Students who cannot be placed will be offered an alternative option.

Chapter 2. Applications and placement for optional subject

47. Applying

Students must apply in good time to take optional subjects.

The information provided on optional subjects will specify how and when students can apply.

If a minimum number of students is necessary in order for an optional subject to go ahead, this will be announced in advance. Students will also be notified in advance if there is a cap on student numbers for an optional subject.

Students who were previously admitted to an optional subject but did not start it must apply again, stating ‘previously admitted’ as their reason.

48. Placement

Students who apply for optional subjects in good time and according to the correct procedure will be placed in those optional subjects, unless there are too many or too few applications. For Study Abroad, other guidelines apply for the placement. For more information, check the student handbook Study Abroad, 31.a Entry and transfer requirements for units of study from the second year, 37. Optional subjects or article 40. Optional subjects.

At least six weeks before the start of term, students will be notified whether they have been placed in their optional subjects. If they have not been given a place, they will be notified of the reasons for this, and also how and within what timeframe they can make a new choice.

Note: Placement alone is not always in itself sufficient for a student to be able to take a unit of study. If other conditions apply for participation in the unit of study, students must meet these too.

49. Too few applications

If fewer than the minimum number of applications are received, the faculty director responsible for that optional subject may decide not to allow the unit of study to go ahead. In that case, the faculty director will offer the students who applied for the optional subject one or more alternative options. Where possible, this will include the option of taking the same or a similar optional subject at another location.

50. Too many applications

If too many applications are received, students will be placed in the order in which they applied. Applications for optional subjects that are not extracurricular will be given priority. See also Article 45. Extra optional subjects. The faculty director will offer

students who are not given a place one or more alternative options. This may include the option of taking the same or a similar optional subject at another location.

For Study Abroad, other guidelines apply for the placement. For more information, check the student handbook Study Abroad, 31.a Entry and transfer requirements for units of study from the second year, 37. Optional subjects or article 40. Optional subjects.

PART 6. STUDY COUNSELLING

Chapter 1. Study counselling

51. Mandatory component of the programme for all students

Every student will receive study counselling and have a study counsellor.

Study counselling is a mandatory component of the programme. It is related to the student's academic phase. It is also possible to receive advice and counselling regarding personal circumstances – see the Student Counsellor page on Iris.

52. Content of study counselling

At a minimum, study counselling includes:

- guidance on choices during students' studies;
- academic progress;
- inquiring after the consequences of the coronavirus measures;
- the study recommendation.

Students can view their own academic progress electronically.

Within study supervision (SS), all students learn how to manage their own academic career. They learn to recognise and utilise their strengths, get to know their limitations (through feedback and reflection) and become able to create a personal development plan. Discussions cover study progress, development of competencies, choices and any factors inhibiting study. The student supervisor plays a supporting role in this. However, students are responsible for their own learning process and are expected to have a proactive attitude.

In this context, the following points are important:

- Students discuss their study progress with their study supervisor.
- Students take a result-oriented approach to their work. Once learning goals and activities have been established, concrete arrangements can be agreed with the study supervisor.
- Students 'learn to learn'. They have an understanding of their own learning style, they know what drives them (and what doesn't) and are able to plan efficiently.
- Students take responsibility for their own learning process and the choices this entails. This includes the choice of an internship position, graduation project, etc.
- Students reflect critically on their own performance and developing level of competence. Based on this, viable learning goals may be set enabling better planning of activities.

Study supervision runs throughout the four years of study. There are two manuals: one for the propaedeutic phase and one for the main phase.

The study supervisor keeps a record of the assignments as described in the manual. To meet their SS requirements, students must attend the compulsory individual discussions and complete the assignments, as defined in the SS manual, to the satisfaction of the study supervisor. Together with the various deliverables produced during the study, the collected assignments make up the students' portfolio. This is how they demonstrate their competence development over four years of study.

Students who receive a BSA warning have a meeting with the study supervisor to discuss any circumstances inhibiting their studies and, if appropriate, to establish an action plan in order to eliminate the backlog.

Chapter 2. Recording data as part of study counselling

53. Recording data in study counselling

For each student, the study counsellor will record the agreements made during study counselling sessions. For disabled students, the study counsellor will also record the relevant agreements they have made. The same applies to agreements with students enrolled as elite athletes.

Students will be given a copy of these agreements on request. For disabled students, more information is given in Article 107. Disability and for elite athletes in Article 66. Adjusted standards for elite athletes and Chapter 2 of this Education Guide.

Students are entitled to view the information recorded about them.

PART 7. STUDY RECOMMENDATION AND BINDING STUDY RECOMMENDATION

For the time being, this part of the TER applies in full. It is possible that the developments in the coming months will give cause for adjusting the provisions related to the binding study recommendation. Such an adjustment will result in an addendum to this TER.

Chapter 1. Study recommendation

54. Content of study recommendation

At the end of the first year of enrolment in the foundation phase of the Bachelor's programme or the Ad programme, students receive a positive or deferred study recommendation in writing from the faculty director relating to the continuation of their studies within the programme or elsewhere. This study recommendation is based on the test results recorded in the PeopleSoft academic monitoring system.

Where necessary, the study recommendation will include a warning or a rejection. More information on a warning is given in 77. Warning, and more information about rejections is contained in Articles 56. Quantitative academic performance standard to 63.

The study recommendation applies to all forms and variants of the programme. If a student switches from one form or variant to another and the programmes are different, the faculty director will adjust the study recommendation after the switch if necessary.

55. When study recommendations will be issued

Students from cohort 2021-2022 and 2022-2023 who enrolled in September will receive the study recommendation by 31 July 2023 at the latest.

Students who are part of the February intake from cohort 2021-2022 and will receive their study recommendations by 1 March 2024 at the latest. This recommendation relates to the first 24 months of study, i.e. up to and including 31 January.

Students who are part of the February intake from cohort 2022-2023 will receive their study recommendations by 1 March 2024 at the latest. This recommendation relates to the first 12 months of study, i.e. up to and including 31 January.

Students who enroll on any date other than 1 September or 1 February will receive their study recommendations:

- at the latest on 31 July 2023 for cohort 21-22 and cohort 22-23 if they started in the September intake;
- at the latest on 1 March 2024 for cohort 20-21 and cohort 22-23 if they started in the February intake.

The standards for the study recommendation are set out in Article 67. Different standard for interim entrants.

Chapter 2. Binding study recommendation in the first year of enrolment

56. Quantitative academic performance standard

a. Level of the quantitative academic performance standard

At the end of the first year of enrolment in the programme, students must have obtained at least 45 of the 60 available credits in the foundation phase. When students have obtained at least 40 credits, of which 25 credits in period 3 and 4, the quantitative standard has been met. Please note: this is a pilot.

b. Quantitative academic performance standard where exemptions have been granted

If students have been granted exemptions from the tests for one or more units of study, the quantitative academic performance

standard will be 84% (50/60) of the remaining number of credits in the foundation phase. This rule also applies to the accelerated curriculum for students with a pre-university education.

If the programme has a quantitative academic performance standard of less than 50 credits, the remaining number of credits will be multiplied by n/60, where n is the number of credits in the standard.

NOTE: not applicable for Horticulture.

57. Qualitative academic performance standard

The programme has one or more qualitative standards for the binding study recommendation. At the end of the first year students must have obtained all these units of study. The programme has the following qualitative standard(s) for the binding study recommendation:

58. Issuing of binding study recommendation

Students must meet the quantitative academic performance standard by the end of the first year of enrolment. If the programme has set a qualitative academic performance standard, students must also meet that standard. If students meet the academic performance standard by the end of the first year of enrolment, they will receive a positive binding study recommendation. If students do not meet the academic performance standard by the end of the first year of study, the binding study recommendation will be postponed. Students from cohort 2021-2022 will have the opportunity until 31 July 2023 (September intake) or 1 March 2024 (February intake) to meet the academic performance standard as set out in article 61. No advice from the student counsellor is required in this respect.

59. Binding study recommendation and personal circumstances

The faculty director will not issue binding study recommendations where students have not been able to comply with the standards for binding study recommendations due to personal circumstances. The procedure for providing evidence of personal circumstances is set out in Articles 82. Personal circumstances and 85. Definition of personal circumstances.

If the programme has set a qualitative academic performance standard and the student has not achieved that standard, and if the personal circumstances which prevented the student from achieving the quantitative academic performance standard did not present an obstacle to meeting the qualitative standard, the faculty director will always issue a negative binding study recommendation.

60. Binding study recommendation and switching out of the accelerated variant

This article does not apply to the programme B Information Technology.

Chapter 3. Binding study recommendation after the first year of enrolment

61. Standard for a binding study recommendation after the first year

If a student did not meet the minimum academic performance standard (quantitative and qualitative, where applicable) at the end of the first year, and the issuing of the binding study recommendation has been postponed, the student must successfully complete the full first-year curriculum during, or by the end of, the second year of enrolment or the time limit set.

This applies to students:

- to whom in the academic year 2020-2021, as a result of the coronavirus measures, postponement was given until 31 July 2022 (1 March 2023 for the February entrants) for achieving the minimum standard;
- to whom in the academic year 2021-2022, as a result of the coronavirus measures, postponement was given until 31 July 2023 (1 March 2024 for the February entrants) for achieving the minimum standard;
- to whom a binding study recommendation could not be issued prior to the academic year 2020-2021 because of personal circumstances
- who did not receive a binding study recommendation because their enrolment was interrupted. See also Article 69. Binding study recommendation following an interruption in enrolment;

62. When a binding study recommendation will be issued after the first year

The faculty director will issue a binding study recommendation upon determination that the student cannot successfully complete the remainder of the first-year programme within the timeframe granted to the student.

The faculty director will not give a negative binding study recommendation if there are personal circumstances; see also Article 82. Personal circumstances. It is necessary that the student counsellor issues advice.

The faculty director will give a positive recommendation if the test results for the programme after the first year clearly indicate the student's suitability.

63. Extending the timeframe

It is possible that, due to personal circumstances, a student may not receive a binding study recommendation during or at the end of the second year of enrolment but will instead receive a warning stating a timeframe. If it subsequently becomes apparent that the student is unable to meet the standard within that timeframe, the faculty director will issue a binding study recommendation at the end of the timeframe specified in the letter. If relevant personal circumstances still exist, the faculty director will again take the severity of these circumstances into account. See also Article 82. Personal circumstances.

Chapter 4. Consequences of a binding study recommendation and when enrolment will end

64. Termination of enrolment

Students who have received a binding study recommendation from Inholland may not continue with the programme. Their enrolment will be terminated.

65. When the enrolment will end

If a binding study recommendation is issued after 1 June, the enrolment will end on 31 August.

If a binding study recommendation is issued earlier in the academic year, the enrolment will be terminated at the time immediately after the end of the last day of the month in which the binding study recommendation was issued. If there are only a few days remaining between the issuing of the recommendation and the last day of the month, the student's enrolment will be terminated one month later.

Chapter 5. Special cases and binding study recommendation

66. Adjusted standards for elite athletes

An elite athlete is a student who meets the conditions set out in the Profile Fund Regulations. These regulations can be found in this Education Guide in Chapter 3.3.

In addition to the provisions of Article 85 h, the faculty director may make an agreement with an elite athlete setting adjusted standards for the first year of enrolment. This will be done as soon as possible after enrolment. The faculty director will send the student a letter setting out the agreements. The faculty director may appoint someone else to make the agreements and send them to the student.

67. Different standard for interim entrants

There is no different standard for interim students.

Quantitative academic performance standard

The faculty director will determine which credits the student will be unable to achieve upon entering in the interim, in light of the scheduling of the classes and tests. This number will be deducted from the first-year study load. (The first-year study load is 60 credits for the regular programme and 45 for the accelerated variant.) The student must achieve 84% of the difference in the first year of enrolment. This number will be rounded up.

If the student has exemptions, the percentage will be applied on the total number of credits minus the number of credits for the units of study for which the student has exemptions, and minus the number of credits that the student will be unable to achieve due to the scheduling of classes and tests. This number will be rounded up as well.

Qualitative academic performance standard
If there is a qualitative academic performance standard, the number of credits for the units of study that form part of the standard and that the student cannot achieve due to entering in the interim will be deducted from that standard.

Soon after the intake, the faculty director will determine what the quantitative and qualitative academic performance standards will be. The faculty director will consult the student first, and then send the student a letter setting out the standards.

68. Binding study recommendation and switching to another programme

If students switch to another Bachelor's programme or Ad programme, the rules of the binding study recommendation will again apply to the new programme.

Important note: After receiving a binding study recommendation, students cannot switch to a programme with the same foundation exam. It is also not possible, after having received a binding study recommendation, to switch from an Ad programme to a Bachelor's programme (or vice versa) with the same foundation exam. The standards for binding study recommendations are set out in Article 56. Quantitative academic performance standard and 57. Qualitative academic performance standard.

After receiving a binding study recommendation, students cannot transfer credits that they obtained in the old programme to the new programme. However, they can apply to the Examination Board for an exemption from tests if they meet the applicable conditions. See also Articles 155. Exemptions from tests to 162. Waiving further investigation.

69. Binding study recommendation following an interruption in enrolment

Students who are deregistered less than two months after enrolment and re-enrol in the same programme in a subsequent academic year will be subject to the same rules around warnings and binding study recommendations as students enrolling in the programme for the first time.

If a student from the September intake terminates their enrolment before receiving a binding study recommendation and then re-enrols in a subsequent academic year, the binding study recommendation standard entails that they must pass the foundation examination in that year. When they enrol, the student will receive a warning notifying them of this fact.

If a student from the February intake terminates their enrolment before September of that year and then re-enrols in the same programme on 1 September, generally speaking the same rules will remain applicable to them regarding warnings and binding study recommendations. The quantitative academic performance standard may be adjusted in individual cases. If this is the case, it will be stated in the warning that the student receives at the time of re-enrolment.

If a student deregisters before the end of the academic year, and they could not have met the BSA standard anymore even if they hadn't deregistered, and if there are no personal circumstances as referred to in Article 85. Definition of personal circumstances, then a binding study recommendation will be issued.

The rules in this Article also apply if a student re-enrols for a programme with the same foundation exam as the programme in which they were previously enrolled.

Chapter 6. Academic progress and international students

70. Students to whom these rules apply

The rules in the following Articles (up to and including Article 75) concerning academic progress apply to students who:

1. do not come from a member state of the EEA or from Switzerland (these are students who require a residency permit); and
2. are covered by the 'Code of Conduct for International Students in Dutch Higher Education'.

These rules are in addition to:

- the rules on academic progress, study recommendations and binding study recommendations in this TER; and
- the academic progress requirements for students who receive a knowledge grant from the university under the Profile

Fund Regulations.

71. Criteria

According to the Code of Conduct, students have made satisfactory academic progress if, in each academic year, they have achieved:

- at least 15 credits by participating in tests in the first two terms;
- at least 30 credits over the entire academic year.

72. Procedure at the end of Term 2 and Term 4

The faculty director determines students' academic progress twice each year:

- at the end of Term 2;
- and at the end of Term 4.

If a student is deemed to have made unsatisfactory academic progress after Term 2 and at the end of the academic year, their study counsellor will discuss this with them. If there are any special circumstances as referred to in Article 86. Other special circumstances, the study counsellor will make a reasonable agreement with the student to ensure that their academic progress is restored to the required level as quickly as possible. The student is required to comply with this agreement.

73. Procedure at the end of the academic year

If at the end of the academic year the faculty director finds that a student is no longer attending any classes at all, or their abilities are insufficient for the level of the programme, the university will report the student to the Immigration and Naturalisation Service (IND) within one month. The 'end of the academic year' is always the end of July/August, even for students from the February intake. If a student is failing to meet the progress standard that applies to them, this will be sufficient reason for determining that their abilities are insufficient for the level of the programme. This does not apply if the study counsellor has made an agreement with the student as described in Article 72. The faculty director will inform the student in a letter of his decision regarding the special circumstances relating to their failure to meet the required standard. This letter will include the faculty director's reasons, as well as information on how the student can appeal against the decision.

74. The university will refrain only once from reporting a student

Where the same set of special circumstances is involved, reporting an international student to the IND for unsatisfactory academic progress can be refrained from only once during the entire period in which the international student is enrolled at the university. The Central Student Administration makes the report on behalf of the faculty director.

International students may fall behind with their studies due to corona measures, as a result of which they will not have time to obtain the number of credits required to retain their residence permit. As part of the administration and retention obligation, the institution must register the study progress of foreign students with a residence permit and report insufficient study progress to the IND. Notification is not required if there is an excusable reason for the delay. Study delays due to corona can be a reason for an excusable delay of their studies. This applies to international students who made insufficient study progress in the academic years 2019- 2020, 2020-2021 and 2021-2022. It is important in this respect that the student could not follow education, i.e. that the programme could not be completed within the nominal time. This is not the case if the student has been offered alternative ways to follow education and was offered the opportunity to obtain sufficient credits. A student can make use of the excusable reason only once.

75. Records

The faculty director makes a record of:

- the unsatisfactory academic progress;
- the personal circumstances; and
- the fact that no report was made.

Chapter 7. Procedure for issuing binding study recommendations

76. No binding study recommendations without prior warning

The faculty director must first give the student a written warning before issuing a binding study recommendation.

77. Warning

If a student's academic progress has been unsatisfactory during their first or second year of enrolment (in the event of postponement of the study recommendation related to coronavirus measures) in the foundation phase, and as a consequence they are in danger of receiving a binding study recommendation, the student will receive a warning from the faculty director. The warning will be given in writing.

78. When the warning will be sent

The faculty director sends the warning in the first year (or second year in the event of postponement of the study recommendation related to coronavirus measures) during the term in which the students' poor academic progress is first noted, or as soon as possible after the end of that term.

If the faculty director only notices students' poor academic progress in Term 4, and is unable to issue a warning due to the resits at the end of that term, the students will receive a warning that they must successfully complete the full first-year curriculum in the second year of enrolment. The warning will form part of the study recommendation.

If a student cannot meet the standard for avoiding a binding study recommendation due to personal circumstances, they will receive a warning that the foundation phase must be successfully completed during or by the end of the second year. The warning will form part of the study recommendation.

79. Content of the warning

The warning will indicate the total number of credits that the student must obtain. The warning will also indicate the date by which the student must have obtained these credits.

The terms in which classes for the units of study in question will be run, and the timing of the tests, are taken into account upon setting this date. The rule is that there should be two test opportunities per academic year, unless one of the exceptions in Article 96. Number of test opportunities per academic year applies.

If the student is subsequently given a new deadline due to personal circumstances, this applies only to the first test opportunity for the remaining units of study.

80. Scope of the warning

The warning applies to all forms and variants of the programme.

In the case of a joint foundation exam, the warning applies to all programmes with the same foundation exam.

If the programme is run in multiple locations, the warning applies to all locations.

However, if students switch from one form, variant or location to another, and the curriculum is different, the warning may be adjusted if necessary. If such an adjustment is made during the first year of enrolment, only the standard will be adjusted.

81. Warning in the case of re-enrolment following deregistration

If a student does not receive a warning because they have already deregistered, and if they re-enrol in the same programme, or in a programme with the same foundation examination, they will receive the warning as soon as possible after re-enrolment.

The standards for a 'Binding study recommendation following an interruption in enrolment', as described in Article 69. Binding study recommendation following an interruption in enrolment, will apply to the warning.

82. Personal circumstances

Students may fall behind in their studies due to personal circumstances. Article 85 outlines what those personal circumstances might be. The faculty director takes any personal circumstances into account when deciding whether to issue a binding study recommendation. The faculty director can only do this if he or she is aware of the personal circumstances. Accordingly, students

must report personal circumstances to the student counsellor. The faculty director will always seek advice from the student counselling service before issuing a binding study recommendation. The student counsellor will provide written advice. In the advice, the student counsellor will address:

- whether the student has reported personal circumstances as defined in article 85. Definition of personal circumstances;

- if so, whether the student has delivered proof of the personal circumstances;

- whether the student counsellor can establish a connection between the personal circumstances and the study credit deficit of the student;

- if possible, for how many study credits the student has fallen behind due to the personal circumstances and/or which period or courses the deficit relates to.

The student counsellor will send the advice to the faculty director and to the student. The faculty director will also consult the study counsellor about students' academic progress and its connection to their personal circumstances.

83. Meeting

Before a binding study recommendation is issued, students will be offered the opportunity to explain their side of the story to the faculty director or to someone else assigned to meet with students on behalf of the faculty director. Among other things, this meeting will include a discussion of whether the overview of academic results achieved is accurate. The participants of the meeting will also look at whether the personal circumstances should be taken into account.

If a student fails to take up an invitation to attend such a meeting, this will be noted in their student file.

Chapter 8 Request for lifting a binding study recommendation

84. Lifting

Students who have received a binding study recommendation may submit a request to the faculty director to review the rejection.

Such review by the faculty director can take place no earlier than twelve months after the date on which the enrolment was terminated due to the binding study recommendation. In their request, students must provide plausible arguments to show that they will now be capable of successfully completing the programme. These arguments can be based by the students on activities, which may include studies, that the students have engaged in since leaving the programme.

The faculty director will not review the rejection if the programme is being phased out or has been discontinued.

Chapter 9. Special and personal circumstances and academic progress

85. Definition of personal circumstances

The personal circumstances that can play a role in the decision of whether to issue a binding study recommendation as described in Article 82. Personal circumstances are:

a. student illness;

b. physical, sensory or other disabilities;

c. pregnancy of the student;

d. special family circumstances;

e. membership of a representative advisory council, faculty representative advisory council, student committee or programme committee at the university;

f. membership of an accreditation committee, as specified in Chapter 5a of the WHW;

g. membership of the board of a student organisation or other administrative activity, as explained in Article 2(3) of the Profile Fund Regulations, which can be found in the Education Guide;

h. competing as an elite athlete (see also Article 66. Adjusted standards for elite athletes);

i. personal circumstances not listed in (a) to (h) above, which, if the board of the university did not take them into consideration, would lead to a significant and unfair disadvantage.

86. Other special circumstances

In addition, the following provisions concerning the academic progress of international students (Articles 70. Students to whom these rules apply to 75. Records) and the validity period of results (Articles 146. Limited validity period for tests and exemptions to 148. End of validity period) apply:

1. a programme cannot be completed within the nominal time;
2. activities in the social sphere.

Students may also fall behind in their studies in a way that makes them eligible for financial assistance under one of the student financial support schemes as outlined in Chapter 3 of this Education Guide.

87. Procedure for establishing special and personal circumstances

a. Notify the student counsellor as soon as possible

If any of the circumstances set out in Articles 85. Definition of personal circumstances or 68. Binding study recommendation and switching to another programme arise and cause a student to fall behind with their studies, they should notify the student counsellor as soon as possible, stating:

- the period of time for which the circumstances applied or will apply;
- what the circumstances are and how serious they are;
- the student must provide evidence; the extent to which the student was or will be unable to participate in classes or tests.

All contacts with students are recorded in the student counselling information system. If students so wish, they can obtain a copy of everything recorded in the system about these contacts.

b. Student Counsellor's Declaration

The student counsellor will draw up a 'Student Counsellor's Declaration' if:

- a student has proven that personal or special circumstances are applicable; and
- the student counsellor has determined that the student has fallen behind or is likely to fall behind in their studies due to these circumstances.

This declaration will specify the date of the first meeting about the circumstances and all matters listed under (a) above. The student counsellor may also include comments, advice and arrangements for the student or for discussion with the study counsellor.

Some circumstances are confidential. If so, the student counsellor will discuss with the student what will be included in the declaration.

c. Discussion with study counsellor and adjustment to study plan

The student will show the Student Counsellor's Declaration to their study counsellor and discuss with the study counsellor the inability to keep up with their studies and any advice they have been given. The student will then adjust their study plan. The discussion and adjustment to the study plan will take place as soon as possible after the meeting with the student counsellor.

If the student involved is an international student, the study counsellor will also talk about the IND's progress requirements. See also Article 73. Procedure at the end of the academic year.

d. Request for special arrangement

Based on special circumstances, a student in possession of a Student Counsellor's Declaration or advice from the student counsellor, may request special arrangements at the Examination Board, the programme or the service organisation.

88. Confidentiality of personal circumstances

Everyone who is aware of a notification of personal circumstances:

- will handle the information in a confidential manner; and

- will use the information only as part of their duties and for the purpose of implementing the regulations in the Education Guide.

The student counsellor complies with the code of conduct for student counsellors and will give information to the programme only:

- within the scope of the student counsellor's role;
- within the parameters of the agreements the student counsellor made with the student about the confidentiality of the information.

PART 8. TESTS

Chapter 1. Content and administration of tests and publication of test standards

89. Connection to unit of study

The final qualifications or learning outcomes and the goals for each test are connected to the unit of study described in attachment "Description units of study", or to a module within that unit of study.

The project task or test questions will clearly and precisely state how students are expected to answer them.

90. Test duration

Students will be given sufficient time to complete the test, according to reasonable benchmarks.

91. Test standards

Test standards for practical work and group assignments are published prior to commencement of these assignments.

The test standards are published prior to publishing the test results.

Chapter 2. Types of tests

92. Types of tests

Appendix: Annual Programmes of the TER specifies the types of tests. There are three types of tests, which can be detailed in various ways:

1. Written
   Students answer test questions on paper or electronically, or they complete projects on paper or electronically.
2. Oral
   Students answer test questions in a meeting (online or physical) with one or more examiner(s).
3. Other
   For the test or project, students perform tasks that will be described clearly by the programme. Possibly a written, digital or oral component, or a combination of these, must also be completed.

If necessary, the type of test can be changed during the academic year, with due regard to the participation in the decision-making process. Students will be informed of this in a timely manner.

93. Oral tests

a. One student examined orally at a time.

In an oral test (online or physical), one student is examined at a time, unless the Examination Board decides otherwise or if testing is conducted in a different manner. If so, this will be announced before the start of the unit of study.

b. Examiners and public access

Oral tests are conducted by two examiners. This may not be the case if it is not feasible from an organisational point of view, or if the test is administered online. In that case, the oral test must be recorded.

This will not be the case for the parts of a degree programme. These will be administered by two examiners. An oral test is open to the public, because that ensures transparency and allows for monitoring of the conduct of the test. This does not apply if the Examination Board decides otherwise.

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c. Rules for conducting tests
Oral tests are conducted by two internal examiners, or by one internal and one external examiner. An external examiner is an independent expert from the professional field.

If an oral test (online or physical) is conducted by a single examiner, an audio or video recording is always made.

d. Protocol
For every oral test, a protocol will be drawn up. The examiners will sign the protocol. If an external examiner was involved in the test, he or she will also sign the protocol. The protocol will be preserved as specified in the university's regulations on retention periods.

If an audio recording of an oral test is made, it will be preserved as specified in the university's regulations on retention periods.

94. Other types of tests

Grounds
Disabled students can ask the Examination Board if they can complete tests in a way that accommodates their disability as much as possible. They can also request any additional or adapted materials they may need to be able to complete the test.

Students can also ask to complete tests in another form for other reasons. The Examination Board will only grant such requests in exceptional, individual cases.

Adjustments are possible only if they do not change the test goals or the level of the test.

Procedure
Students must request an alternative form of test by the start of term at the latest. They should submit their requests in writing to the Examination Board. The letter should set out the reasons for the request and enclose a copy of the advice received from the student counsellor (Click here for more information about advice from the student counsellor).

The Examination Board will make a decision as soon as possible, at any rate no later than fifteen working days after receiving the complete request.

Chapter 3. Timing and frequency of tests

95. Timing of tests
Each unit of study will, if possible, end with one or more tests in the term in which the teaching was delivered. If the teaching was delivered over a whole semester, the test will, if possible, take place in that semester.

If a unit of study is composed of modules, the modules will likewise be completed, if possible, within the term or semester in which the unit of study was delivered.

The year programme states when the tests take place.

96. Number of test opportunities per academic year
For all tests of the programme in the form or variant as followed by the student, they will have two test opportunities per academic year, within normal term time. There are four exceptions to this rule. If there is an exemption, this will be set out in Schedule 1 of this TER.

- There may be only one test opportunity per academic year for tests *after the first year*, for which no resit can be scheduled in the same academic year due to the nature of the study unit. This applies, for example, to work placements in the fourth term.
- For some tests, the programme may indicate that students will be given more than two opportunities to complete them.
- The programme may also indicate that it will offer only one test opportunity in each academic year.
- It can be the case that offering two test opportunities per academic year is not feasible for all tests as a result of the coronavirus measures. If, due to these measures, it is not possible to offer two opportunities to take a test to the student in the current academic year, the opportunity/opportunities that has/have not been offered will be offered in the next

academic year.

There are no exceptions in the number of test opportunities.

Chapter 4. Resits

Note: The programme B Information Technology uses the test concept of programmatic assessment. We are not talking about resits, but about personalized recovery processes or remediation. Students are given the opportunity to demonstrate compliance with the set standard with additional evidence or documentation. The scope and the purport of the articles below do apply.

97. Timing of resits

The final resit opportunity in the first year will be scheduled before the end of Term 4. This is due to the fact that study recommendations need to be issued in time.

For tests which form part of the curriculum from the second year onwards (see the proviso in Part 7), resits can also be scheduled before the start of the new academic year. in other words, in Term 5.

98. Resit when test passed at first opportunity

Students who have passed a test are not entitled to a resit.

However, a student may want to resit a test in an exceptional situation. In this case, they must submit a request to the Examination Board, which will make a decision within thirty working days. If the Examination Board grants the request, the highest result that the student achieves will apply.

99. Additional opportunity due to special circumstances

In exceptional cases, the Examination Board may decide to provide an additional test opportunity.

This will only occur if personal circumstances exist as described in Article 85. Definition of personal circumstances, or in other extremely exceptional cases.

Students must submit a request to the Examination Board and state the reasons for their request. The Examination Board will seek advice from the student counsellor, if the Board deems this to be necessary. The Examination Board will make a decision within fifteen working days.

In view of the consequences of the corona measures, the binding study recommendation for students of cohort 2021-2022 is being postponed to 31 July 2023 (September intake). As a result, for the academic year 2021-2022, it will be possible to offer students from cohort 2021-2022 additional opportunities in the curriculum of the first-year programme even after 3 July 2022.

This is not possible for students of cohort 2020-2021; for these students, the programme after 3 July 2023 offers no teaching or tests from their first year. This is because these students will receive their study reccomendation by 31 July 2023 at the latest.

100. Resits in the context of curriculum obsolescence and updating

Special rules apply to resits if a curriculum is obsolete or being updated. See Articles 21. Curriculum obsolescence and updating to 24. Evaluation of the programme.

Chapter 5. Bringing forward test opportunities

101. Bringing forward

An Examination Board may permit a student, on a one-off basis, to take one or more tests earlier, so that the student can pass the final examination without a disproportionate delay.

This is subject to the condition that bringing forward the test opportunity is reasonably possible.

If both test opportunities in the academic year have already passed, the student will be given a third test opportunity. The student

must submit a request to the Examination Board and state the reasons for the request.

The Examination Board will make its decision within fifteen working days after receiving the complete request. The Examination Board deals with these requests with leniency.

102. Conditions for bringing forward test opportunities

For a test opportunity to be brought forward, the student must meet the following conditions:

1. They must have a maximum of 10 credits left to obtain for a 240 credits programme, or a maximum of 7 credits for a 180 credits programme before completing the final examination.
2. For the obtaining of the remaining credits, the student is not subject to any attendance requirement for classes, nor is there any obligation to execute group projects.
3. The student cannot attend any classes or complete any tests in the next term or terms, due to the university's timetabling. This is based on the four ordinary terms of the academic year.
4. The student has:

- attended the classes associated with the tests;
- taken the tests concerned; and
- tried to pass the tests with adequate preparation.

Chapter 6. Time, place and duration of tests

103. Test timetable, testing room, materials

In the first two weeks of each term, the Service Point will publish the **test timetable** that the programme has set on Iris. If there are any changes to **testing rooms**, these will be announced at least two working days before the test date.

The programme arranges test dates so that they are spaced in an optimal way for students. The period of time in which a written of oral or test is taken is called a **test session**.

In the first two weeks of term, the examiner will publish a list of the **materials** that students may use in the test.

Students must also comply with:

- the rules concerning materials set out for the unit of study;
- the provisions regarding these rules in the test session instructions; and
- the instructions given by the Examination Board.

104. Deadline for submitting work

The test timetable will state the deadline for submitting work by the student other than in a test session. If this date is not stated in the test timetable, it will be announced in good time in another manner.

It will also be announced in advance what the consequences are if students do not submit work or do not submit it in a timely manner. This does not apply if this information is already included in attachment "Descriptions Units of Study".

105. Length of the test session

Written test

A written test session lasts a maximum of 180 minutes, unless the Examination Board has set a longer timeframe for a particular student.

Oral test

An individual oral test session will last a minimum of 15 and a maximum of 60 minutes. This does not apply if the nature of the test session makes a longer timeframe necessary. attachment "Descriptions Units of Study"indicates the length of each test session. If necessary, it also states the reason for the length of a particular test session.

Chapter 7. Special test arrangements

106. Language deficiency

If a student can prove that they are receiving additional instruction in the Dutch language at a suitable level for the purpose of participating in their programme, the Examination Board may grant an arrangement to the student. The student must submit a request for this to the Examination Board, providing evidence that the student follows a programme at the appropriate level. This applies in any case for students admitted on the basis of the Dutch as a Second Language (NT2) diploma, Programme II or another diploma at the same level. This programme should train the student in such a way that it enables the student to achieve level 4F at the end of the programme. The Examinations Board may extend the test session by up to thirty minutes. In addition, students may also be permitted to use a dictionary. This arrangement will be granted for a maximum of two years.

107. Disability

The Examination Board may decide to extend a test session for students with a disability by up to 60 minutes. They may also offer students additional auxiliary materials, or they may do both. Students must personally submit a request to this effect. Before the student submit a request, the student counselor must be asked for advice. The student counselor may draw up an advice per request by the student. The advice will be sent to the Examination Board. More information about the student counsellor can be found here.

108. Alternative test time or location

In very exceptional circumstances, the Examination Board may allow students to sit a test at another time or in another location. A disability is an example of exceptional circumstances.

109. Submitting a request for special arrangements

Students must submit their requests for special arrangements in writing to the Examination Board at the start of term. If the exceptional situation does not arise until later, students must submit their request as soon as possible after the situation arises. Ideally, the Examination Board would then put the special arrangements in place for the current term. If that is not possible because a student has submitted their request too late, the Examination Board will put the special arrangements in place for the next term.

In their letters, students must explain the reasons for their request.

If a student has a disability, they must include an electronic or written opinion from the student counsellor. If the student counsellor has accepted a statement from an external expert, the student counsellor must state this in the opinion.

The Examination Board will inform students of its decision in writing at the latest within fifteen working days after the submission of a complete request.

Chapter 8. Registering for tests

110. Which tests to register for

Students must register for tests each term within the designated registration period. Registration is necessary for:

- written test sessions; and
- tests for which students must submit work that will be submitted and assessed via the digital environment.

111. What happens if students do not register in time

Students who fail to register in time can still register at the Service Point in the week following the registration period. They will then be entered through the Service Point.

Without registration, students cannot participate. If students failed to register due to circumstances beyond their control, they must submit a request to the Examination Board as soon as possible, seeking permission to participate. Such requests must be in writing and must explain the reasons for the request.

The Examination Board will inform students of its decision in writing at the latest within fifteen working days after the submission of a complete request.

112. Identical tests

If students are enrolled for more than one programme at the university, and these programmes offer the same test, the registration will apply to both programmes. However, there will still be only two test opportunities per year. The result will be recorded under both programmes.

113. Confirmation of registration

Students will receive confirmation of registration. Such confirmation does not always mean that students may participate. They may participate only if they meet all of the conditions for taking part in the test. These include both the general conditions in this TER and the conditions set out in attachment "Descriptions Units of Study".

Chapter 9. Participation and attendance requirement

114. Participation in group work

Students are required to actively participate in group work.

If a lecturer notices that a student is not cooperating and does not see any improvement despite encouraging the student to cooperate, the lecturer may tell the student that they can no longer participate in the unit of study or module. The lecturer must then report the student to the Examination Board as soon as possible. The Examination Board will make an official decision about whether the student may continue to take part in the unit of study or module.

Before the Examination Board makes its decision, it will give the student an opportunity to tell their side of the story. A report of this meeting will be drawn up.

If the teaching group, tutorial group or lecturer in question has not made sufficient effort to ensure that the student cooperates, the Examination Board can decide that the student may continue to participate. The Examination Board will make a decision within thirty working days.

115. Attendance, active participation and/or preparation requirements

If it is a requirement for a unit of study that students be present, actively participate and prepare in advance, the Examination Board may decide, on a proposal from the lecturer concerned, that a student may no longer participate. This may happen only if this is included in the description for the unit of study in the attachment "Descriptions Units of Study".

Before the Examination Board makes its decision, it will give the student an opportunity to tell their side of the story. A report of this meeting will be drawn up.

In exceptional cases, the Examination Board may determine that students are not required to be present for all or for certain classes or are not required to prepare all or part of the work. If so, it will set substitute requirements for these students. In such cases, students must submit a request to the Examination Board, which will make a decision within thirty working days.

116. Consequences of a decision to exclude

A decision by the Examination Board to exclude a student will prevent the student from participating in the next test for the unit of study in question, unless a different penalty is specified in the unit of study description.

Chapter 10. Assessment

117. Examiner(s)

Every test will be graded by one or more examiners. The Examination Board determines who the examiners will be.

If a test is graded by more than one examiner, the Examination Board will designate one to be the primarily responsible examiner. The primarily responsible examiner consults with the other examiner(s) to decide on the grades and associated feedback. The

primarily responsible examiner then communicates the grades and feedback to the students. This is always the case when grading units of study that are part of a graduation programme or of a component of a graduation programme.

118. Grading procedure

The examiner grades the work against the test standards published in writing prior to the test. The Examination Board can change test standards or allow them to be changed. This may be done only in exceptional cases and only if the Examination Board explains why it is making the change.

Students have passed a test if the examiner determines that their written or oral work meets the requirements.

119. Grading transparency

Students must be able to see from the test standards and the grading procedure how their results were determined.

120. Assessing work placements and graduation products

The procedure for assessing work placements and the graduation programme parts will be documented in writing in a test protocol, together with the associated test forms.

Assessment of a unit of study that is part of a graduation programme or of a component thereof will be done by at least two examiners, unless the attachment "Descriptions Units of Study" states otherwise. The Examination Board may appoint an internal supervisor as an examiner, but not as the primarily responsible examiner.

The examiner, or where there are multiple examiners, the primarily responsible examiner, is responsible for the final grade awarded for the work placement and for the unit of study that is part of the graduation programme or a part thereof.

When assessing the work, the opinion of an external supervisor serves as advice to the examiner.

121. Assessing the vocational component of dual-form programmes and work placements

For dual-form programmes, the test protocol is appended to the work-study agreement so that the vocational component can be assessed. For work placements, the test protocol is appended to the work placement contract. The appendix contains the feedback and the opinion of the trainee supervisor on the student's performance. The trainee supervisor signs this document and sends it to the examiner.

The opinion of the trainee supervisor serves as guidance for the examiner who is responsible for the test.

Chapter 11. Grades and grading scales

122. Grading in points

Tests are graded on a grading scale from 10–100.

Students have passed if they obtain a grade of 55 points or more.

If the grade is less than 10 points, it will be recorded as a grade of 10.

123. Grading in letters

A. Grading a test with either 'Pass' or 'Fail'

For reasons relating to programme content, a test may be given a grade of either 'Pass' or 'Fail'.

B. Grading a test with above average/ average/ below average

For reasons relating to programme content, a test may be given a grade of above average, average or below average.

124. Submitting a blank test paper

If students submit a blank test paper, they will receive a grade of 10, or an F (Fail) in the case of a unit of study or module in which no grades are awarded.

125. Failure to participate in a test opportunity

If students do not participate in a test opportunity that applies to them, no result will be recorded in the academic monitoring

system; however, they are considered to have used the test opportunity.

The same applies if students fail to register or cancel their registration.

Deregistering for a test by students is appreciated because it is helpful for organisational reasons to know who will be participating. But if a student doesn't register, this will have no effect on the number of test opportunities remaining to them.

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126. Converting grades obtained at other universities

If a grade from another university is expressed using a different scale from the one applied by Inholland, the grade will be converted to one based on the scale from 10–100. The Examination Board will make rules for this procedure and appoint an examiner to convert the grade.

If the grade is obtained at an international university, a Pass (V) or Fail (O) will be listed instead of a grade. When a student is eligible for a designation as described in article 181. 'With merit' of 182. 'Cum laude' or when they need a certain average grade for further education, the student can request the Examination Board to convert the result from the international university into a grade.

The Examination Board will make a decision within fifteen working days.

127. Grade for a unit of study

The grade for a unit of study is the weighted average of the grades for the modules and tests in the unit of study, based on the ratio of the weights of the modules and tests as defined in Schedule 1 of this TER.

The main rule when awarding a grade for a unit of study is that students must pass all interim tests (obtaining 55 points or more) in order to be deemed to have passed the unit of study. This means that it is not possible to compensate for failed tests within a unit of study.

Units of study for which Schedule 1 of this TER states that compensation is possible are an exception to this rule. In that case, the rules that apply to compensation will be indicated for the unit of study. The final grade for a unit of study must, unrounded, always be at least 55 points.

128. Final grade

Students must pass every unit of study.

The grade for each unit of study (see Article 127. Grade for a unit of study) is converted into a final grade on a grading scale from 1–10. This final grade is stated in the list of grades attached to the degree certificate. Final grades will be rounded off to the nearest whole number, as is customary in the Netherlands.

For a limited number of units of study, the final grade may be expressed as either a 'Pass' or a 'Fail'. That will be the case if it is impossible to express the grade as a grade, as this is fitting for the study programme.

However, only a very limited number of units of study can have a final grade of 'Pass' or 'Fail'. If students have too many units of study with exemptions or 'Pass' grades, they will be unable to achieve a 'with merit' or 'cum laude' designation. For more information about "with merit" and "cum laude" designations, see Articles 181. 'With merit' and 182. 'Cum laude'.

Chapter 12. Test results

129. Timeframe for issuing results for oral tests and practical assignments

The examiner determines the test results of oral tests and practical assignments after they have been completed. If possible, the examiner will let students know the approximate result immediately after the test.
Students receive their final results no later than ten working days after the test via the PeopleSoft academic monitoring system.

130. Timeframe for issuing results for written tests

Students receive their final results via the Peoplesoft academic monitoring system no later than fifteen working days after the test date or the final submission deadline of the test.

131. Timeframe for issuing results for special written tests

For some types of written tests, students receive their final results via the PeopleSoft academic monitoring system no later than twenty working days after the test date or final submission deadline of the test. These types of tests include research reports, work placement reports and theses. If these timeframes apply, this will be indicated under the details of the type of test in the unit of study description in the attachment "Description units of study".

132. Alternative timeframes

The Examination Board can change the grading timeframes set out in Articles 129, 130 and 131. If they do so, they must state their reasons. The Examination Board will ensure that timeframes in respect of tests that are important for binding study recommendations are such that the recommendations can be issued on time. If timeframes are extended, students will be notified immediately.

133. Notification of results

Students will receive a message that their results have been recorded in the PeopleSoft academic monitoring system. They can make a copy of their results as evidence.

The message will advise students of their right to access their test work. See also Article 149. Right of access The message will also tell students that they may appeal to the Examination Appeals Board via the digital Complaints and Disputes portal on Iris.

134. Reviewing results

If it becomes apparent, after a report from a student or during follow-up discussion of the test, that a grade is incorrect, the examiner can change the result. The provisions that applied when the examiner determined the first result also apply here.

135. Correction of grades

If the result in the academic monitoring system is not the same as the result previously communicated by the examiner, the student concerned can ask the examiner to change the result. The student must do so within four weeks of the date on which the result was entered in the academic monitoring system. He must submit documents to substantiate the request.

The student may appeal the examiner's decision not to change the result. The appeal should be submitted within six weeks to the Examination Appeals Board via the digital Complaints and Disputes portal on Iris.

136. Submission and retention of work, misplaced work

For every test, the examiner or an invigilator will establish that students are present and have submitted work by recording the fact on the attendance list.

Students should ensure that they keep a digital or physical copy of all submitted work outside a test session.

If the examiner is unable to determine a result because the work has been misplaced, the examiner will notify the Examination Board.

The student will have to take the test again. If necessary, the Examination Board can allow the student an additional test opportunity to do so.

The Examination Board will make a decision within thirty working days.

Chapter 13. Irregularities, fraud and plagiarism

137. Rules relating to tests

The rules that apply to the completion of test sessions can be found:

- in the instructions for test sessions; and
- attachment "Description units of study".

The Examination Board may set additional rules. If so, these rules will be published within the first two weeks after the start of the term. They will also appear on the test cover sheet.

The instructions deal with written test sessions but apply by analogy to other forms of tests.

In all tests, students must comply with these rules and with the instructions given by the invigilator, the examiner or the Examination Boa

138. Irregularities

If something happens during the test process that is not in compliance with the rules as set out in the TER, the regulations or the instructions for test sessions, this is referred to as an irregularity. An irregularity *may* also be fraud or plagiarism, but this is not always the case.

As a result of irregularities, it may be determined that the test is invalid for one student, for all students who took part, or for a group of students who took part, even if they were not to blame for the irregularity. This decision will be made if it is no longer possible to conduct an accurate assessment of knowledge, understanding, skills or professional attitude. See also Articles 144. Grounds for a declaration of invalidity and 145. Consequences of a declaration of invalidity.

139. Disturbance

If a student causes a disturbance during a test to the extent that it affects other students sitting the test, the invigilator may ask the student to leave the testing room. The invigilator will make a note in the protocol. The Examination Board will decide as soon as possible whether the invigilator did the right thing in asking the student to leave. In doing so, it will follow the procedure set out in Article 142.

If the student refuses to leave the testing room, the invigilator may decide to allow the student to remain to prevent additional commotion that could affect the other students. In this situation, the invigilator will not give the student's work to the examiner but will instead give it to the Examination Board. The invigilator will make a note of the event in the protocol.

The Examination Board will make a decision in the same manner as if the student had actually left the room. If the Examination Board decides that the request to the student to leave was not justified, the examiner will grade the student's work.

If the Examination Board decides that the student's removal was justified, this is considered to be the same as if the student had submitted a blank test paper. The student will be given a grade of 10 (on the grading scale from 10–100) or F (Fail).

If the Examination Board decides that the student's removal was not justified, the student may sit the test again. The Examination Board will decide when and how that will happen.

140. Fraud/serious fraud

1. Fraud is an act or omission by a student that makes it wholly or partially impossible to conduct an accurate assessment of their knowledge, understanding, skills or professional attitude. Examples of fraud include, but are not limited to, events when a student:

a. uses materials during the test that they are not permitted to use;

b. cheats during a test;

c. gives information about a test to other people or receives such information, either inside or outside the testing room;

d. makes up and/or falsifies survey or interview answers or research data;

e. uses or reproduces another person's texts, reasoning, data or ideas without fully and correctly referencing the source (plagiarism).

2. Serious fraud includes, but is not limited to, events when a student:

f. falsifies tests, for example by making changes to work after being granted an opportunity to view it;

g. doing the test (or allowing it to be done) wholly or partially by or for another;

h. falsifying and/or forging a signature;

i. if the abovementioned under 1.d. and 1.e. occurs in a section of the graduation programme.

Repeated fraud may be designated as serious fraud.

141. Participating in fraud

Participating in fraud is also deemed to constitute fraud. Participating in fraud includes, but is not limited to:

- allowing students to cheat;

- giving information to or receiving information from another person during a test;
- giving someone the questions, tasks or model answers before or during a test;
- sitting a test or completing all or part of an assignment in another person's name.

This list of participating in fraud is not exhaustive.

142. Procedure in the event of irregularities and suspected fraud

Report to the Examination Board
If an invigilator or examiner notices irregularities or suspects fraud before, during or after a test – while grading, for example – they will note it in the protocol that is drawn up for each test.

Student rights and obligations
Students may be asked to submit all the documents, data or items that may have played a role in the – suspected - fraud. If a student refuses to do so, this will be noted in the protocol.

Students may have their comments regarding the event recorded in the protocol. In that event, they may sign the protocol, but they are not required to do so.

The invigilator or examiner will give the Examination Board:

- the protocol;
- supporting documents, if any; and
- the work completed by the student, if necessary.

Postponement of grading
If irregularities or suspected fraud are uncovered before the work is graded, the work of the student involved will not be graded until the Examination Board has made a decision.

Meeting
Before the Examination Board makes a decision, the student may tell their side of the story. A report of this meeting will be drawn up. Before the Executive Board makes a decision on a proposal to deregister the student, the student may tell their side of the story. A report of this meeting will be drawn up.

1. *Decision-making*

The Examination Board will make a decision within 30 working days about whether fraud has occurred, based on:

- the written documents; and
- what the student said during the meeting.

If fraud is found to have occurred, the Examination Board will determine whether it was serious fraud.

The Examination Board will then decide on the measures to be taken. The possible measures are set out in Article 143.

143. Measures in the event of fraud

Measures in the event of fraud
If fraud has occurred, the Examination Board will take measures that are appropriate to the fraud.

These measures are exclusively the following:

- The Examination Board confirms the measures taken by the examiner or invigilator.
- The student receives a written warning.
- The Examination Board declares the student's test invalid. In that case, the work will not be graded. If the work has already been graded, no grade will be entered in the PeopleSoft academic monitoring system. If there is already a grade in the system, it will be removed. In both cases, the letters ME (Measures of the Examination Board) will be entered.
- The Examination Board decides that the student may not take part in the next opportunity for the same test.
- The Examination Board decides that the student may not take part in any tests for a period determined by the Examination

Board. That period will not exceed one year.

Measures in the event of serious fraud
In the event of serious or repeated fraud, the Examination Board may recommend to the Executive Board that the student's enrolment in the programme be terminated. The Examination Board will consult the faculty director first.

Chapter 14. Declaring results to be invalid

144. Grounds for a declaration of invalidity
The Examination Board may determine that a result is invalid if, after the result was announced, it was found that any of the following had occurred:

- an irregularity that made an accurate assessment impossible, even if the student(s) were not to blame for the irregularity;
- fraud;
- a ruling by an appeal body.

The Examination Board will make a decision within 30 working days after becoming aware of any of the above circumstances.

145. Consequences of a declaration of invalidity
If a result is declared to be invalid, the grade recorded for the student(s) concerned will be replaced with ME (Measure Examination Board). The Examination Board will inform the student(s) of its decision in writing, also informing them of their right of appeal.

If the work is to be re-graded and a new result determined, the Examination Board will instruct an examiner to do so. The new result will be recorded in place of the result that was removed.

Chapter 15. Validity period of completed tests and obtained exemptions

146. Limited validity period for tests and exemptions
A test result has a limited validity period if the following two conditions both apply:

- The test result has an expiry date, which is indicated in Article 23. Expiry date, transition period and validity period of this TER;
- and the knowledge, understanding or skills being assessed are demonstrably obsolete.

There are no education and test results with an expiry date for the programme.

147. End of validity period
The validity period for an obsolete test result with an expiry date will end:

- for the foundation phase: three years after the first enrolment;
- for an accelerated programme: two years and eight months after the first enrolment;
- for the main phase of the Bachelor's programme: five years after the first enrolment for the main phase. If the student has an exemption for the foundation phase: five years after the first enrolment.

148. End of validity period

a. Extension and special circumstances
The Examination Board may extend the validity period for students:

- with special circumstances, as described in the Profile Fund (see Chapter 3 of this Education Guide);
- and for whom the validity period in Article 147 is too short.

They do not have to comply with the other conditions in Article 85. Definition of personal circumstances.

The Examination Board will ask the student counsellor for advice about:

- whether the special circumstances fall within the scheme; and
- how much of a delay the special circumstances have caused to the student's studies.

b. Extension in other circumstances
If there are any special circumstances other than those referred to above under a), and in the opinion of the Examination Board they have caused a delay in a student's studies that is not adequately compensated for by the validity period for the tests, the Examination Board may extend the validity period. The student in question must submit a request to that effect to the Examination Board.

The student may submit a new request if new special circumstances arise or the circumstances continue.

For the reporting of a study completion delay due to special circumstances and the resulting further activities, the procedure in Article 87. Procedure for establishing special and personal circumstances applies. This is not the case if that procedure already applies based on other rules in the Education Guide.

Students must submit the extension request:

- electronically;
- stating reasons why they are asking for an extension;
- and before the validity period expires.

Where a student submits a request late but has a good reason for doing so, the Examination Board will still accept the request for handling.

The Examination Board will make its decision within 30 working days after the complete request is submitted.

Chapter 16. Accessing, discussing and requesting copies of tests

149. Right of access
Students are entitled to view and discuss their graded work. They can do so at the latest up to four weeks after notification of the result of a written test via the PeopleSoft academic monitoring system.

Programmes determine when and where students can view and discuss their work. This may also take place digitally. When they view their work, students can also see the test standards that were used.

The Examination Board may instruct students how to view their work, for example to prevent students from disseminating test material.

150. Right to obtain a copy in the event of a dispute
If a student and an examiner disagree on a result, a copy of the work (or relevant part thereof) which they disagree on will be created, free of charge. The student needs this copy in order to lodge an appeal. The student must request the copy personally.

Chapter 17. Retention of tests

151. Original retained by the university
The university will always keep the original of important written documents, such as important essays, work placement reports, research reports, theses and components of graduation programmes.

152. Retention period
The university will retain these documents, as well as final research projects, examinations and assignments that students have produced in this respect for a minimum of seven years. They may be kept in electronic or hard copy format. The university will retain these documents for longer if that is stated in the university's regulations governing retention periods.

The university will retain other student work and recordings of oral tests which are not covered by the above list of documents for two years. This is in accordance with the university's regulations governing retention periods.

153. Inclusion in university records to comply with statutory obligations

A copy of the documents referred to in Articles 151 and 152 will be kept in a file or archive to be used for the work of the university. This will be done only if the documents are deemed to be suitable for this purpose. The documents are necessary in order to comply with statutory obligations, such as a visit/accreditation. They may be consulted if that is in line with the university's objectives.

The same applies to inclusion in the HBO Knowledge Base: www.hbo-kennisbank.nl.

If the documents contain confidential information or if third parties have rights to the work, this will be respected. However, a work as a whole cannot be regarded as confidential.

154. Keeping and retaining a (digital) portfolio

The programme does not work with a (digital) portfolio.

Chapter 18. Exemptions

155. Exemptions from tests

The Examination Board may decide that a student does not have to complete any tests for a particular unit of study or a module. This is called an 'exemption'.

156. Unit of study exemptions

Students will be given an exemption for a unit of study if they have been granted exemptions for all tests in that unit of study.

157. Exemptions after switching programmes within the university

If students switch to another programme within the university, they can take their test results and exemptions with them only if they have applied for exemptions in this respect. The same applies to any results students have previously obtained in study programmes at the university that are not government-funded.

158. Exemption criteria

Students may be granted exemptions if they:

- have previously passed tests and examinations within the higher education system;
- have demonstrably acquired knowledge and skills outside of the higher education system which are approximately the same as the unit of study/module and associated test(s) in terms of:
- content;
- level;
- required final qualifications.

If a student requests an exemption based on tests completed in a foreign institution, the Examination Board will consider the quality of the institution in its decision. The evaluation of quality will be based on a previous investigation by the university or on the Examination Board's own investigation.

159. Exemptions granted solely based on up-to-date knowledge and experience

The Examination Board will grant exemptions only based on up-to-date knowledge and experience.

Generally, the Examination Board applies a period of five years when considering what 'up to date' is. In other words, the tests or examinations must have been completed no more than five years before the date of the exemption application. The same applies to knowledge and skills acquired outside of the higher education system.

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160. Exemptions procedure and evidence

Requests for exemptions must be submitted to the Examination Board in writing (or by email). Students must explain the reasons why they are asking for an exemption and enclose supporting documents.

The Examination Board may ask a student to provide further information or additional documents. It may also request any information it deems to be necessary in order to make a decision.

Supporting documents may include:

- copies of certificates bearing the stamp of the relevant organisation;
- transcripts showing tests and examinations, or certificates; the student must provide a full description of study or degree programmes or relevant components thereof. The same applies to results previously achieved as a contract student in the same programme at the university;
- copies of theses, articles, reports or coursework that:
- have been written by the student; and
- have been assessed and certified by an authorised body;
- a stamped copy of an APL report issued in accordance with the APL Quality Code by an accredited APL provider. The report must clearly show that the student has the knowledge and skills required for the requested exemption; the student must also provide the associated documents if the Examination Board asks for them.

The Examination Board will make a decision on a complete exemption application within 30 working days. The Examination Board may extend this timeframe once, by a maximum of 30 working days.

161. Further investigation

If the Examination Board determines, on the basis of an investigation, that a student cannot be granted an exemption for all tests in a unit of study, the Examination Board may decide to grant an exemption following a further investigation. This investigation involves a comparison by the Examination Board of the final qualifications that the student is lacking against the content of the unit of study.

The investigation may entail that the student must pass an ordinary test.

In its decision, the Examination Board will set a deadline by which the further investigation must be successfully completed.

If a student sits tests which are covered by the exemption, it will be assumed that they did so in the context of this investigation. If the student fails the test, they will not be granted an exemption for all the tests.

The Examination Board may determine that the validity of a result will end earlier than the date resulting from the general exemptions policy (see Articles 146. Limited validity period for tests and exemptions t/m 148). The Examination Board may do so when:

- the student's request relates to an exemption they previously received for another programme at the university;
- or the programme is being updated.

162. Waiving further investigation

If the Examination Board decides that a component of a test is not essential in terms of the conditions as specified in the unit of study description regarding the acquisition of the knowledge, understanding and skills required to obtain the degree, it may decide not to conduct an investigation into that component. This may only occur in an exceptional case, such as disability or religious belief. It also depends on the reasons given by the student.

163. Exemptions prior to enrolment

The Examination Board may also decide to grant an exemption before a student is enrolled. In that case, the student will receive the exemption only once they have actually enrolled.

164. Exemption from foundation examination

If a student has obtained an exemption for all foundation phase tests, he is deemed to be exempt from the foundation examination, unless the Examination Board has conducted its own investigation as described in Article 173. Examination Board investigation.

In that case, the student will not receive a foundation certificate.

165. No exemption from final examination

Students can only obtain a limited number of exemptions for the final examination of a Bachelor's programme.

For this final examination, students must obtain a minimum of 60 credits by successfully completing tests. This includes units of study connected with a graduation programme or part thereof. In the case of an accelerated pre-university education pathway, this will be a minimum of 45 credits. This includes units of study connected with a graduation programme or part thereof.

166. Recording exemptions

If an exemption is granted for a test, the word 'vrijstelling' (exemption), or the abbreviation 'VR', will be recorded in place of the test result in the PeopleSoft academic monitoring system. This will be based on the date on which the student is notified of the decision. If this date is prior to the date of enrolment, the date of enrolment will be used.

Chapter 19. Unit of study substitution; national and international mobility

167. Request for substitution

Students may request the Examination Board to let them substitute one or more of the units of study which they still need to complete, along with the associated tests, with units of study and associated tests from another programme offered by the university or by another Dutch or foreign institution of higher education. Students must explain the reasons for their request. This is subject to the condition that students still meet the requirements of the examination, and that the study load in credits must remain the same.

The Examination Board will make its decision within 30 working days after the complete request is submitted.

168. No request required

Students do not need to submit a request if there is a partnership agreement between the university and another institution in the Netherlands or abroad.

169. Rules for teaching and testing in the case of a substitution

Any classes taken and tests completed at other institutions will be subject to the rules for teaching and testing of that institution. This does not apply if the Examination Board decides otherwise in this respect.

170. Other conditions

The Examination Board may impose other conditions on the substitution of units of study and the associated tests. The substitution of units of study and associated tests with those of a foreign institution is subject to the condition that the quality of the foreign institution can be established by the Examination Board, based on:

- a previous investigation by the university;
- or the Examination Board's own investigation.

The Examination Board may also seek advice from Nuffic (the Dutch organisation for internationalisation in education).

PART 9. EXAMINATIONS, DEGREE CERTIFICATES AND TRANSCRIPTS

Chapter 1. Examinations

171. Foundation and final examination

The programme includes both a foundation examination and a final examination.

172. Requirements for passing the examination

Students have passed the foundation examination if:

- they have passed the tests for all units of study that are part of the foundation phase of the programme;
- and the validity period of those tests has not expired.

This does not apply if the Examination Board decides to conduct its own investigation, as described in Article 173.

Students have passed the final examination if:

- they have passed the tests for all units of study that are part of the main phase of the programme;
- and the validity period of those tests has not expired.

This does not apply if the Examination Board decides to conduct its own investigation, as described in Article 173.

173. Examination Board investigation

The Examination Board may decide that the examination, in addition to the tests in the programme, will include an investigation conducted by the Examination Board itself into students' knowledge, understanding and research.

This investigation is more or less the same as a test.

The Examination Board of the programme does not conduct its own investigation.

174. Requirements for passing the examination

In exceptional cases, the Examination Board may decide that students do not have to pass every part of a test in order to be deemed to have passed the examination. The Examination Board may set conditions for such a decision. Examples of exceptional cases are a disability or religious belief.

The Examination Board may make such a decision if it considers that a component of a test is not essential in terms of the requirements specified in the unit of study description for acquiring the knowledge, understanding and skills required to obtain the degree.

The Examination Board will then determine the final grade for the unit of study in a fair and reasonable manner, as much as possible in accordance with the rules set out in the TER. In doing so, the Examination Board will not give any consideration to the component in question.

Chapter 2. Degree certificates and transcripts

175. Degree certificate

The Examination Board awards a degree certificate to students as proof that they have passed their final examination.

The Examination Board may decide to award the degree certificate only if the Central Student Administration declares that the student has paid all amounts due and payable by the student.

The degree certificate states the date on which the student is deemed to have passed the final examination. This is the date on which the student completed his/her last test. If the Examination Board has conducted its own investigation as described in Article 173, then the date on the certificate will be the date of the investigation.

The certificate will also state the name of the degree that has been awarded by the Executive Board.

The Examination Board awards degree certificates within five to eight weeks after students pass the final examination. The student will receive a notification with a request to check the data that will be displayed on the degree certificate. The Examination Board will then invite the student for the ceremony in which the certificate is awarded. If an Examination Board does not take the initiative to award a student's degree certificate, the student must request the Examination Board to award the certificate.

176. List of grades and diploma supplement

The Examination Board provides a list of grades with the degree certificate and also encloses a diploma supplement, except in the case of the foundation certificate.

177. Deferral of awarding of the degree certificate

If a student is entitled to receive a degree certificate but wishes to wait because it would be more advantageous to do so, and if the advantage the student would obtain is reasonable, then the student may request a deferral from the Examination Board using the designated form. On the form, the student should explain why the deferral is important to him and how long he wants to wait.

This is usually so that the student can complete an additional unit of study and have it included in the list of grades as an extracurricular unit of study, and not for the purpose of completing a second study programme. Deferrals are generally for no longer than six months. In any event, it is a condition of a deferral that the student not interrupt their enrolment. Note: deferrals can have consequences, for example for the student travel product. This should be checked with the Education Executive Agency (DUO).

178. Transcript

If a student has passed more than one test and the Examination Board does not award a degree certificate to the student, the student will receive a transcript from the Examination Board upon his request. At a minimum, the transcript will specify:

- the units of study for which the student passed the tests;
- the number of credits for those units of study;
- when the student passed the tests.

Chapter 3. With merit and cum laude designations

179. Recording on the degree certificate

The Examination Board may record a 'with merit' or 'cum laude' designation on the degree certificate for each examination for which a positive result has been achieved.

For the final examination, the Examination Board only counts the results from the main phase.

180. Basis of calculation

In performing the calculation, the Examination Board will use the final grades before rounding off for the units of study of the examination.

If a unit of study has several tests, this concerns the final grade before rounding off for that unit of study based on the calculation of the average in accordance with Articles 127. Grade for a unit of study and 128. Final grade.

In addition, the student must not have been studying for a longer period than the study duration as scheduled by the university. This does not apply if the longer study duration is due to personal circumstances or other special circumstances. The Examination Board will determine whether this is the case. Delay in a student's studies, which has demonstrably occurred as a result of coronavirus measures, will be regarded as a special circumstance.

181. 'With merit'

The designation of 'with merit' will be recorded on the degree certificate if:

- the weighted average final grade for all units of study is 7.0 or more;

- of these final grades, no grade is less than 6.5 before rounding off; and

- the student has received no more than 15 credits' worth of exemptions in the case of a 240 credits programme, or 11 credits in the case of a 180 credits programme.

In calculating the weighted average final grade, the Examination Board will not take into account the results for units of study that were awarded a 'Pass' or 'Fail' grade. A student can request the Examination Board to calculate the result from a foreign institution into a grade, so the grade can be taken into account for the weighted average final grade.

If a student has received more than 15 credits' worth of exemptions in the case of a 240 credits programme, or 11 credits in the case of a 180 credits programme, they may still obtain the 'with merit' designation if:

- the actual duration of the student's studies was correspondingly shorter due to these exemptions; and

- the number of credits for the final examination which the student achieved through tests, amounts to at least half of the total number of credits for that examination.

182. 'Cum laude'

The designation 'cum laude' will be recorded on the degree certificate if:

- the weighted average final grade for all units of study is 8.0 or more;

- of these final grades, no grade is less than 7.0 before rounding off; and

- the student has received no more than 15 credits' worth of exemptions (in the case of an accelerated pre-university pathway, 11 credits).

In calculating the weighted average final grade, the Examination Board will not take into account the results for units of study that were awarded a 'Pass' or 'Fail' grade. A student can request the Examination Board to calculate the result from a foreign institution into a grade, so the grade can be taken into account for the weighted average final grade.

If a student has received more than 15 credits' worth of exemptions in the case of a 240 credits programme, or 11 credits in the case of a 180 credits programme, they may still obtain the 'cum laude' designation if:

- the actual duration of the student's studies was correspondingly shorter due to these exemptions; and

- the number of credits for the final examination which the student achieved through tests, amounts to at least half of the total number of credits for that examination.

Moreover, for the final examination the final grade before rounding off for the units of study that form part of the graduation programme must be at least 8.0. Schedule 1 of this TER sets out which unit of study will be the determining factor for the designation 'cum laude'.

PART 10. FINAL AND TRANSITIONAL PROVISIONS

183. Updating the TER

The TER will not be changed during the academic year, unless the interests of students will not be adversely affected by the change. It can be the case that, in spite of the previous provision, the coronavirus measures make changes necessary. In the event of these changes, the contents hereof must be taken into consideration.

184. Unforeseen circumstances

In any situations not provided for by the TER, a decision will be made by:

- the Executive Board, if the situation concerns general provisions;
- the faculty director responsible for the programme, if the situation concerns programme-specific provisions.

When implementing the TER, if staff members cannot agree on who has authority in a particular situation, the Executive Board will designate the competent body.

185. Publication, entry into force and authentic version

This TER forms part of the Education Guide of the university as referred to in Section 7.59 of the WHW

The Executive Board may extend the period of validity of general provisions of the TER. This can only be done for an entire academic year. The representative advisory council must give consent for the extension.

The faculty director can extend the period of validity of the programme-specific information. This can only be done for an entire academic year. The representative advisory council must give consent for the extension.

In the event of a discrepancy or difference of interpretation of the provisions of the TER, the text of the Dutch version will take priority over any version in another language.

Appendix: Annual Programmes

Programme: **Informatica** Faculty: **Engineering, Design, Computing** Mode of study: **full-time**

Overview units of study

Legend

AF	Graduation part
PR	Graduation part designation
KE	Qualitative requirement (BSR)
BD	Professional component
OP	Optional professional or educational component
EW	Requirements for the job
KZ	Choice whether there are requirements for the job
C	Compensation within the unit of study

Academic year 1

Unit of study	Code	Term	ECTS	Specific details
Basic curriculum				
Web Markup	1918IN111Z	■□□□	3	
Web Design	1918IN112Z	■□□□	3	
Programming 1	1918IN113Z	■□□□	3	
Networks	1917IN114Z	■□□□	3	
Mathematics	1918IN115Z	■□□□	3	
Management Information Systems	1918IN121Z	□■□□	4	
Professional Skills Year 1a	1920IN129Z	□■□□	1	
Linux 1	1918IN123Z	□■□□	3	
Introduction to Modeling	1918IN124Z	□■□□	3	
Programming 2	1918IN126Z	□■□□	4	
Communication 1	1921IN131Z	□□■□	3	
Databases	1916IN133Z	□□■□	4	
Programming 3	1918IN133Z	□□■□	3	

Unit of study	Code	Term	ECTS	Specific details
Project Database	1921IN138Z	■■■■	3	
Project Management 1	1921IN135Z	■■■■	2	
Routing	1916IC141Z	■■■■	3	
Interaction Design	1917IN142Z	■■■■	3	
Communication 2	1918IN143Z	■■■■	1	
Design Patterns	1918IN144Z	■■■■	3	
Project Building applications	1921IN145Z	■■■■	4	
Professional Skills Year 1b	1920IN147Z	■■■■	1	

Academic year 2

Unit of study	Code	Term	ECTS	Specific details
Basic curriculum				
Java Fundamentals	1917IN232Z	■■■■	3	
IT Service Management	1919IN231Z	■■■■	6	
NoSQL	1920IN233Z	■■■■	5	
Individual Project	1913IN225Z	■■■■	1	
Project Application Design	1919IN211Z	■■■■	4	
Functional Modeling	1913IN214Z	■■■■	2	
User Interface Design	1911IN212Z	■■■■	2	
Project Management 2	1917IN214Z	■■■■	2	
Web Development 1	1917IN215Z	■■■■	3	
English	1911IN215Z	■■■■	2	
Project Web Application	1918IN221Z	■■■■	5	
Entrepeneurship & ICT	1921OSICTZ	■■■■	2	
Web Development 2	1920IN223Z	■■■■	4	
Linux 2	1920IN226Z	■■■■	3	
Professional Skills Year 2a	1919IN227Z	■■■■	1	
Project Code Generation	1921IN241Z	■■■■	6	
Java Advanced	1921IN248Z	■■■■	3	

Unit of study	Code	Term	ECTS	Specific details
Social Ethical/Legal Research	1917IN243Z	■■■■	5	
Professional Skills Year 2b	1919IN247Z	■■■■	1	

Academic year 3

Unit of study	Code	Term	ECTS	Specific details
Basic curriculum				
Internship	1920PRSTGZ	■■■■	29	
Professional Skills Year 3	1920PROF3Z	■■■■	1	
Elective: Big Data & AI 1				
Project Big Data & AI: Design	1922PBDAIZ	■■■■	5	
Big Data & AI Fundamentals	1922BDAIFZ	■■■■	2	
Computer Vision 1	1922CVIS1Z	■■■■	2	
Data Mining & Statistics	1922DMSTAZ	■■■■	3	
Python & Tools	1922PYTHTZ	■■■■	1	
Research Big Data	1922RESBDZ	■■■■	2	
Elective: Big Data & AI 2				
Project Big Data & AI: PoC	1922BDPOCZ	■■■■	6	
Parallel Distributed Processing	1922PARDPZ	■■■■	3	
Computer Vision 2	1922CVIS2Z	■■■■	2	
Natural Language Processing	1922NLNGPZ	■■■■	2	
Capita Selecta	1922CAPSLZ	■■■■	1	
Professional Presenting	1916GE011Z	■■■■	1	
Elective: Game Engineering 1				
Game Programming	1918GE004Z	■■■■	4	
Project Game Engineering 1	1922GE002Z	■■■■	9	
Research Game	1919GE003Z	■■■■	2	
Elective: Game Engineering 2				
Project Game Engineering 2	1922GE007Z	■■■■	10	
Mathematics	1913GE006Z	■■■■	4	

Unit of study	Code	Term	ECTS	Specific details
Professional Presenting	1916GE011Z	■■■■	1	
Elective: Security				
Professional Presenting	1916GE011Z	■■■■	1	
Penetration Testing	1922SEC02Z	■■■■	4	
Network Security	1920SEC03Z	■■■■	3	
Information Security	1916SEC04Z	■■■■	1	
Secure Programming	1918SEC05Z	■■■■	3	
Project Offensive Security	1922SEC06Z	■■■■	3	
Elective: User Experience				
Research UX	1919UE005Z	■■■■	2	
Psychology of Interaction	1918UE001Z	■■■■	2	
UX Methodologies	1919UE002Z	■■■■	2	
Workshop UX	1920UE003Z	■■■■	3	
Project UX	1920UE004Z	■■■■	6	

Academic year 4

Unit of study	Code	Term	ECTS	Specific details
Basic curriculum				
Graduation	1914IN441Z	■■■■	29	AF PR
Professional Skills Year 4	1917IN442Z	■■■■	1	
Elective: Cloud Computing 1				
Cloud Databases	1920CLD01Z	■■■■	3	
Server Side Programming	1918MOBL2Z	■■■■	3	
Research Cloud 1	1922CLD03Z	■■■■	2	
Project Cloud API	1920CLD04Z	■■■■	7	
Elective: Cloud Computing 2				
Cloud Infrastructure	1922CLD05Z	■■■■	5	
Dev/Ops and SRE	1922CLD06Z	■■■■	2	
Microservices Architecture	1922CLD07Z	■■■■	3	

Unit of study	Code	Term	ECTS	Specific details
Project Cloud API 2	1922CLD08Z	■■	3	
Research Cloud 2	1922CLD09Z	■■	2	
Elective: Mobile Development 1				
Mobile Platforms	1918MOBL1Z	■■	6	
Mobile User Interface Design	1920MOBL3Z	■■	2	
Project Application Design	1920MOBL4Z	■■	5	
Research Mobile 1	1922MOBL8Z	■■	2	
Elective: Mobile Development 2				
Research Mobile 2	1920MOBL6Z	■■	2	
Project Mobile Application	1922MOBL7Z	■■	10	
Mobile Security	1922MOBL5Z	■■	3	
Elective: Security				
Research Security	1916SEC01Z	■■	2	
Penetration Testing	1920SEC02Z	■■	4	
Network Security	1920SEC03Z	■■	3	
Information Security	1916SEC04Z	■■	1	
Secure Programming	1918SEC05Z	■■	3	
Project Secure Cloud API	1920SEC06Z	■■	2	

Overview of tests

Legend

GRD	Grade assessment scale with the minimum score in parenthesis
SUS	Pass / fail scale
NIV	3-point level scale (exceeds the standard / meets the standard / does not yet meet the standard)
0%-100%	Weighting factor
SBU	Number of study hours
S/M/AW	Examination format (Written, Oral, Other method)
TZ	Examination session
AP	Compulsory attendance

LN	Longer timeframe for issuing results

Academic year 1

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Basic curriculum							
Web Markup	Web Markup	1918IN111A	GRD(55)	100%	84	AW	
Web Design	Web Design	1918IN112A	GRD(55)	100%	84	AW	
Programming 1	Programming 1	1918IN113A	GRD(55)	100%	84	S	TZ
	Assignments Programming 1	1918IN113B	SUS	0%	0	AW	
Networks	Networks (CCNA 1)	1912IC114A	GRD(55)	100%	84	S	TZ
	Networks practical	1917IN114B	SUS	0%	0	AW	
Mathematics	Mathematics	1918IN115A	GRD(55)	100%	84	S	TZ
Management Information Systems	Management Information Systems	1918IN121A	GRD(55)	100%	84	S	TZ
	Assignments Management Information Systems	1918IN121B	SUS	0%	28	AW	
Professional Skills Year 1a	Professional Skills Year 1a	1920IN129A	SUS	100%	28	AW	AP
Linux 1	Linux 1	1918IN123A	GRD(55)	100%	84	S	TZ
Introduction to Modeling	Introduction to Modeling	1918IN124A	GRD(55)	100%	84	S	TZ
Programming 2	Programming 2	1918IN126A	GRD(55)	100%	84	S	TZ
	Assignments Programming 2	1918IN126B	SUS	0%	28	AW	
Communication 1	Linguistic Test: English	1918IN131A	GRD(55)	33%	28	S	TZ
	Interviewing and Report Writing	1918IN131B	GRD(55)	67%	56	S	AP LN
	Dutch Language and Culture	1921IN131C	SUS	0%	0	AW	AP
Databases	Databases (SQL)	1912IC136A	GRD(55)	50%	56	S	TZ
	Datamodeling (ERD)	1912IC128A	GRD(55)	50%	56	S	TZ
Programming 3	Programming 3	1918IN133A	GRD(55)	100%	84	S	TZ
	Assignments Programming 3	1918IN133B	SUS	0%	0	AW	

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Project Database	Project Database	1916IN138A	GRD(55)	100%	84	S	AP LN
	Process dossier	1921IN138B	SUS	0%	0	AW	
Project Management 1	Projectmanagement 1	1918IN135A	GRD(55)	100%	28	S	TZ
Routing	Routing (CCNA 2)	1912IC141A	GRD(55)	100%	50	S	TZ
	Routing Practical	1916IC141B	SUS	0%	34	AW	
Interaction Design	Interaction Design	1913IC142A	GRD(55)	50%	42	S	TZ AP
	Design document	1917IN142B	GRD(55)	50%	42	S	LN
Communication 2	Presentation	1918IN143A	GRD(55)	100%	28	AW	AP
Design Patterns	Design Patterns	1918IN144A	GRD(55)	100%	84	S	TZ
	Assignments Design Patterns	1918IN144B	SUS	0%	0	AW	
Project Building applications	Building applications	1918IN145A	GRD(55)	80%	84	AW	AP
	Project documentation	1918IN145B	GRD(55)	20%	14	S	AP LN
	Process dossier	1919IN145C	SUS	0%	14	S	AP LN
Professional Skills Year 1b	Professional Skills Year 1b	1920IN147A	SUS	100%	28	AW	AP

Academic year 2

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Basic curriculum							
Java Fundamentals	Java Fundamentals	1917IN232A	GRD(55)	100%	84	S	TZ
IT Service Management	IT Service management theory	1918IN231A	GRD(55)	50%	84	S	TZ
	Project IT Service Management	1918IN231B	GRD(55)	50%	84	S	AP LN
	Process dossier	1919IN231C	SUS	0%	0	AW	AP
NoSQL	NoSQL Project	1918IN233A	GRD(55)	60%	84	AW	AP
	NoSQL Theorie	1918IN233B	GRD(55)	40%	56	S	TZ
Individual Project	Individual Project	1913IN225A	GRD(55)	100%	28	AW	
Project Application Design	Application Design	1915IN211A	GRD(55)	100%	84	AW	AP
	Functional Documentation	1919IN211B	SUS	0%	28	S	AP LN
	Process dossier	1918IN211C	SUS	0%	0	S	AP LN

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Functional Modeling	Functional Modeling (UML)	1913IN214A	GRD(55)	100%	56	S	TZ
User Interface Design	User Interface Design	1911IN212A	GRD(55)	100%	56	S	TZ
Project Management 2	Project Management 2	1917IN214A	GRD(55)	100%	56	S	TZ
Web Development 1	Web Development 1	1917IN215A	GRD(55)	100%	84	AW	
English	English	1911IN215A	GRD(55)	100%	56	AW	
Project Web Application	Application	1917IN221A	GRD(55)	80%	112	AW	AP
	Technical documentation	1918IN221B	GRD(55)	20%	28	S	AP LN
	Process dossier	1918IN221C	SUS	0%	0	S	AP LN
Entrepeneurship & ICT	Business Plan	1921OSICTA	SUS	0%	28	S	LN
	Business Pitch	1921OSICTB	GRD(55)	100%	28	AW	
Web Development 2	Web Development 2	1917IN223A	GRD(55)	100%	112	AW	
Linux 2	Linux 2	1918IN226A	GRD(55)	50%	56	S	TZ
	Linux 2 Practical	1920IN226B	GRD(55)	50%	28	AW	
Professional Skills Year 2a	Professional Skills Year 2a	1919IN227A	SUS	100%	28	AW	AP
Project Code Generation	Code Review	1918IN241A	GRD(55)	10%	17	AW	AP
	API design	1918IN241B	GRD(55)	25%	42	AW	AP
	API testing	1918IN241C	GRD(55)	25%	42	AW	AP
	Code assessment	1918IN241D	GRD(55)	40%	67	AW	AP
	Process dossier	1919IN241E	SUS	0%	0	S	AP LN
Java Advanced	Java Advanced	1915IN248A	GRD(55)	100%	84	S	TZ
Social Ethical/Legal Research	Desk Research	1917IN243A	GRD(55)	100%	84	S	LN
	Peer Feedback	1917IN243B	SUS	0%	28	AW	AP
	Debating	1917IN243C	SUS	0%	28	AW	
Professional Skills Year 2b	Professional Skills Year 2b	1919IN247A	SUS	100%	28	AW	AP

Academic year 3

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Basic curriculum							

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Internship	Internship start document	1920PRSTGA	SUS	0%	200	S	AP LN
	Internship Report	1920PRSTGB	GRD(55)	80%	600	S	AP LN
	End Presentation Internship	1920PRSTGC	GRD(55)	20%	12	M	TZ AP
Professional Skills Year 3	Professional Skills Year 3	1920PROF3A	SUS	100%	28	AW	AP
Elective: Big Data & AI 1							
Project Big Data & AI: Design	Cleaned/prepared dataset	1922PBDAIA	GRD(55)	30%	42	AW	AP
	Trained Model	1922PBDAIB	GRD(55)	40%	56	AW	AP
	TFGD	1922PBDAIC	GRD(55)	30%	42	AW	AP
Big Data & AI Fundamentals	Big Data & AI Fundamentals	1922BDAIFA	GRD(55)	100%	56	S	
Computer Vision 1	Computer Vision 1	1922CVIS1A	GRD(55)	100%	56	S	TZ
Data Mining & Statistics	Data Mining & Statistics	1922DMSTAA	GRD(55)	100%	84	S	
Python & Tools	Python & Tools	1922PYTHTA	GRD(55)	100%	28	S	
Research Big Data	Research Big Data	1922RESBDA	GRD(55)	100%	56	S	
Elective: Big Data & AI 2							
Project Big Data & AI: PoC	Proof of Concept Application	1922BDPOCA	GRD(55)	50%	84	AW	AP
	Advice Report / Publication	1922BDPOCB	GRD(55)	50%	84	S	AP
Parallel Distributed Processing	Parallel Distributed Processing	1922PARDPA	GRD(55)	100%	84	S	
Computer Vision 2	Computer Vision 2	1922CVIS2A	GRD(55)	100%	56	S	
Natural Language Processing	Natural Language Processing	1922NLNGPA	GRD(55)	100%	56	S	
Capita Selecta	Capita Selecta	1922CAPSLA	GRD(55)	100%	28	S	
Professional Presenting	Professional Presenting	1915GE011A	GRD(55)	100%	28	S	AP LN
Elective: Game Engineering 1							
Game Programming	Game Programming	1918GE004A	GRD(55)	100%	112	S	TZ
Project Game Engineering 1	Vertical Slice	1918GE002C	GRD(55)	100%	140	AW	AP
Research Game	Research Game	1919GE003A	GRD(55)	100%	56	S	LN

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Elective: Game Engineering 2							
Project Game Engineering 2	Goldmaster	1917GE007A	GRD(55)	50%	140	AW	AP
	Code Assessment	1917GE007E	GRD(55)	50%	140	AW	AP
Mathematics	Mathematics theory	1913GE006A	GRD(55)	50%	42	S	TZ
	Mathematics practical	1913GE006B	GRD(55)	50%	42	AW	
Professional Presenting	Professional Presenting	1915GE011A	GRD(55)	100%	28	S	AP LN
Elective: Security							
Professional Presenting	Professional Presenting	1915GE011A	GRD(55)	100%	28	S	AP LN
Penetration Testing	Final assignment	1922SEC02A	SUS	33%	56	AW	AP
Network Security	Netwerk Security	1916SEC03A	GRD(55)	100%	56	S	TZ
	Netwerk Security Practical	1916SEC03B	SUS	0%	28	AW	
Information Security	Information Security	1916SEC04A	GRD(55)	100%	28	S	TZ
Secure Programming	Secure Programming	1918SEC05A	GRD(55)	100%	84	S	TZ
Project Offensive Security	Project Offensive Security	1922SEC06A	GRD(55)	100%	84	AW	
Elective: User Experience							
Research UX	Research UX	1919UE005A	GRD(55)	100%	56	S	LN
Psychology of Interaction	Psychology of Interaction	1918UE001A	GRD(55)	100%	56	S	TZ AP
UX Methodologies	UX Methodologies	1919UE002A	GRD(55)	100%	56	S	AP LN
Workshop UX	Workshop 1	1919UE003A	SUS	0%	28	AW	AP
	Workshop 2	1918UE003B	GRD(55)	100%	56	AW	AP
Project UX	Alpha	1918UE004A	GRD(40)	20%	42	AW	AP
	Beta	1918UE004B	GRD(40)	30%	42	AW	AP
	Release Candidate	1918UE004C	GRD(40)	20%	42	AW	AP
	Gold Master	1918UE004D	GRD(40)	30%	42	AW	AP

Academic year 4

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Basic curriculum							

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Graduation	Graduation paper	1914IN441A	GRD(55)	70%	588	S	AP LN
	Oral Exam	1914IN441B	GRD(55)	30%	224	M	TZ AP
Professional Skills Year 4	Professional Skills Year 4	1917IN442A	SUS	100%	20	AW	AP
Elective: Cloud Computing 1							
Cloud Databases	Cloud Databases	1920CLD01A	GRD(55)	100%	84	AW	
Server Side Programming	Server Side Programming	1918MOBL2A	GRD(55)	100%	84	AW	
Research Cloud 1	Research Cloud 1	1922CLD03A	SUS	100%	56	S	LN
Project Cloud API	API model documentation	1916CLD04A	GRD(55)	20%	40	S	LN
	Presentation API model	1916CLD04B	SUS	0%	14	M	TZ
	Code review	1919CLD04C	GRD(55)	40%	64	AW	
	Code assessment	1916CLD04D	GRD(55)	40%	64	AW	
	Presentation final product	1916CLD04E	SUS	0%	14	M	TZ
Elective: Cloud Computing 2							
Cloud Infrastructure	Cloud Infrastructure	1922CLD05A	GRD(55)	100%	140	AW	
Dev/Ops and SRE	Dev/Ops and SRE	1922CLD06A	GRD(55)	100%	56	AW	
Microservices Architecture	Microservices Architecture	1922CLD07A	GRD(55)	100%	84	AW	
Project Cloud API 2	Project Cloud API 2	1922CLD08A	GRD(55)	100%	84	AW	
Research Cloud 2	Research Cloud 2	1922CLD09A	GRD(55)	100%	56	S	LN
Elective: Mobile Development 1							
Mobile Platforms	Apple	1918MOBL1A	GRD(55)	50%	84	AW	
	Android	1918MOBL1B	GRD(55)	50%	84	AW	
Mobile User Interface Design	Mobile User Interface Design	1920MOBL3A	GRD(55)	100%	56	AW	
Project Application Design	Project Application Design	1920MOBL4A	GRD(55)	100%	140	AW	AP
Research Mobile 1	Research Mobile 1	1922MOBL8A	SUS	100%	56	S	LN
Elective: Mobile Development 2							
Research Mobile 2	Research Mobile 2	1920MOBL6A	GRD(55)	100%	56	S	LN

Unit of study	Test	Code	Scale	Weight	SBU	Mode	Specific details
Project Mobile Application	Mobile app bèta version	1915MOBL7A	GRD(55)	40%	90	AW	AP
	Mobile App Development	1915MOBL7B	GRD(55)	60%	152	AW	AP
	Presentation Mobile App	1915MOBL7C	SUS	0%	0	M	TZ AP
Mobile Security	Paper Security	1919MOBL5A	SUS	0%	56	S	LN
	Mobile Security	1919MOBL5B	GRD(55)	100%	28	S	TZ
Elective: Security							
Research Security	Research Security	1916SEC01A	GRD(55)	100%	56	S	LN
Penetration Testing	Final assignment	1918SEC02A	GRD(55)	100%	56	AW	AP
	Workshops	1918SEC02B	SUS	0%	56	AW	AP
	Presentatie Eindopdracht	1918SEC02C	SUS	0%	0	M	TZ AP
Network Security	Netwerk Security	1916SEC03A	GRD(55)	100%	56	S	TZ
	Netwerk Security Practical	1916SEC03B	SUS	0%	28	AW	
Information Security	Information Security	1916SEC04A	GRD(55)	100%	28	S	TZ
Secure Programming	Secure Programming	1918SEC05A	GRD(55)	100%	84	S	TZ
Project Secure Cloud API	Project Secure Cloud API	1920SEC06A	GRD(55)	100%	56	AW	AP

Year 1

Basic curriculum

Term 1

Web Markup - 1918IN111Z

Content of unit of study	In this study unit students compile a website in HTML5 and CSS3.
Learning outcomes	**Implement**: ■ 1.1 Implement and test static ICT and/or digital media products, using standard tools, a range of suitable (media) formats, and a limited usage of stylistic devices. (UI) ■ 1.2 Layout and test a local infrastructure and make it available. (IS) **Manage**: ■ 1.1 Establish and use a management system to support software development in a team (SW) **Research skills**: ■ 7.3.2 Clearly formulate the goal and research questions based on the problem analysis
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Web Markup - 1918IN111A

Assessment objectives/criteria	The final product of the website has the following prerequisites: ■ The website is available on a hosting server (single files/ documents will not be validated); ■ The URL of the website will be emailed to the lecturer before the final exam date; ■ correct validation will be done with the W3C HTML Validation service and the W3C CSS validation, in which correct means: no errors; ■ Public availability without the use of authentic login; ■ The website has to apply to the proper semantics; ■ The website has to comply to the design/ format provided by the course; ■ The website has to be responsive; ■ Sources of comments, images, photo's, video material or any other media material have to be made available; ■ The use of Bootstrap, WordPress or any other framework is prohibited. Please note: if the website was not submitted or the URL has not been sent via e-mail to the lecturer a NS (NoShow) will be issued. However, if the website is submitted, yet does not comply to the prerequisites, the mark 10 (10-100) will be issued. The following requirements for the website are mandatory, which also comply to the prerequisites: ■ Clear and recognizable page names of which each page is finalized with HTML; ■ The site is validated beforehand and possible errors have to be solved. (during the assessment the website may not hold any errors, they may hold warnings);

	▪ Correct application of HTML5 structure; ▪ Correct application of CSS(3) design. Please note: The teacher has the liberty to change the content of certain lectures and requirements however he sees fit. Please keep an eye on Moodle to see whether any changes have been put forward.
Details of assessments	The product "the website" will be assessed at the end of the term and provided with a mark.
Strategies and teaching activities	Starting the lectures, theory is discussed, followed by practical assignments. The students are provided with a theoretic framework during the lectures Webmarkup. Students receive support during the lectures to realise the final product "the website".
Compulsory attendance (See also Article 115 TER)	No
Permitted aids	PC/ MAC, internet and software to compile the webpage (students are free to choose Notepad++, Brackets or Visual Studio). Hosting account will be provided by the course (as a service).

Web Design - 1918IN112Z

Content of unit of study	Students gain an understanding of the various disciplines belonging to Web Design.
Learning outcomes	**Competency Analyse**: ▪ 1.1 (UI) Catalogue the design repertoire (shape, colour, stylistic features) and describe the brand or product identify of a current ICT and/or digital media product. ▪ 1.2 (UI) Identify target groups and objectives and link these to user behaviour and interaction. **Competency Design**: ▪ 1.1. (UI) Design a static and dynamically limited ICT and/or digital media product, applying given techniques, such as scenarios, storyboards and wire frames, and matching usability tests. **Competency Implement**: ▪ 1.1 (UI) Implement and test static ICT and/or digital media products, using standard tools, a range of suitable (media) formats, and a limited usage of stylistic devices. Above competencies apply to the Architectural layer “User interaction” in the Domain description Bachelor of ICT.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	Tools and literature that will be used ding this course will be published on Moodle.

Assessment: Web Design - 1918IN112A

Assessment objectives/criteria	During classes and as homework, students complete a number of assignments as preliminary work for the website design assignment and to practise specific skills in the design tool(s). All these assignments need to meet the requirements. The web design principles learned are applied when designing the website.

	The web design will be assessed based on the mastery of both mastering the tool and design principles. The Web Design assessment consists of 2 parts: ▪ Various preliminary tasks for the website such as a project proposal, content, wireframes and design variants ▪ Designing a website for a specific audience, with a specific message. In order to get a final grade the project proposal needs to be sufficient, received a “Go”. **Principles of web design** Students are able to create a design which: ▪ Suitable for the target audience; ▪ Communicates a clear message; ▪ Utilizes a clear navigation and menu structure including feedback to the user where he is in de website; ▪ Has consistent styling: layout, formatting, use of colours and fonts; ▪ Includes an appropriate logo. **Skills in image editing / prototyping tool** Students are able to: ▪ Create a (photo) realistic design using the assigned editing tool. For example Figma; ▪ Create own content (at least containing text and pictures).
Details of assessments	Other format; both the documented design process (logbook) and final design (prototype) need to be handed in.
Strategies and teaching activities	Lectures on theory combined with practical exercises
Compulsory attendance (See also Article 115 TER)	No
Permitted aids	To do the assignments a computer, the necessary software and a digital camera are needed.

Programming 1 - 1918IN113Z

Content of unit of study	Students learn to build, test and provide access to simple Console and Windows Forms applications using an development environment. The following topics are covered: ▪ Basic principles of coding; ▪ Structured coding in a C#; ▪ Analysis of a programmable problem; ▪ Implementing an algorithm for a programmable problem.
Learning outcomes	**Competency Analyse**: ▪ 1.7 Analyse a simple problem and create an algorithm to solve it. (SW) **Competency Implement**: ▪ 1.3 Build and test an elementary software system and make it available. (SW)
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Programming 1 - 1918IN113A

Assessment objectives/criteria	Skills assessed include: ▪ Analyse a programmable problem and implement a suitable algorithm; ▪ Declare and use variables and constants; ▪ Apply sequence statements; ▪ Apply selection statements (if/switch) for conditional statements; ▪ Apply iteration statements (for/while/do-while) for repetition of statements, and flow control (break/continue/return); ▪ Apply methods; ▪ Declare and use arrays.	
Details of assessments	Practical exam, students must individually implement a number of programs using C# in a development environment (Visual Studio).	
Strategies and teaching activities	Lectures and assignments	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	IDE (Visual Studio)	

Assessment: Assignments Programming 1 - 1918IN113B

Assessment objectives/criteria	See assessments objectives/criteria module “Programming 1”.	
Details of assessments	The mandatory assignments are checked partially automatically and partially manually (by practical teacher), and feedback is given on the code. If the assignments are not approved, students get a second chance in the next term.	
Strategies and teaching activities	Students start working on the mandatory assignments during the practical classes; the assignments must be handed-in at the latest in the next practical class. The assignments must be completed individually. Students may discuss their work, but are not allowed to copy code from others nor share code with others.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	IDE (Visual Studio)	

Networks - 1917IN114Z

Content of unit of study	This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum. By the end of the course, students will be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.
Learning outcomes	**Competency Design**: ▪ 1.3 (IS) Draw up specifications for a local infrastructure according to a standard method. **Competency Implement**:

	▪ 1.2 (IS) Layout and test a local infrastructure and make it available.
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Networks (CCNA 1) - 1912IC114A

Assessment objectives/criteria	Students who complete Introduction to Networks will be able to perform the following functions: ▪ Understand and describe the devices and services used to support communications in data networks and the Internet; ▪ Understand and describe the role of protocol layers in data networks; ▪ Understand and describe the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments; ▪ Explain fundamental Ethernet concepts such as media, services, and operations; ▪ Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks.	
Details of assessments	Students sit for a written multiple-choice test.	
Strategies and teaching activities	Lecture	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	During the exam students are allowed to use pen and paper.	

Assessment: Networks practical - 1917IN114B

Assessment objectives/criteria	Students can: ▪ Build a simple Ethernet network using routers and switches; ▪ Use Cisco command-line interface (CLI) commands to perform basic router and switch configuration and verification; ▪ Utilize common network utilities to verify small network operations and analyze data traffic.	
Details of assessments	Students take a Skills Test. (Pass/Fail)	
Strategies and teaching activities	A practical section, allowing students to apply what they have learned.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Students are allowed to use PowerPoint Slides and the Command List.	

Mathematics - 1918IN115Z

Content of unit of study	Subjects covered include: ▪ Integers ▪ Fractions ▪ Powers and roots ▪ Algebra ▪ Special products ▪ Fractions with letters ▪ First degree equations

	▪ Second degree equations ▪ Systems of first degree equations
Learning outcomes	**Competency Analyse**: ▪ 1.6 Analyse and solve a simple mathematical problem.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Mathematics - 1918IN115A

Assessment objectives/criteria	**Integers** ▪ Addition/subtraction/multiplication of integers ▪ Determining quotient and remainder using long division ▪ (Prime) factorization of a number ▪ Determining the gcd and lcm (of two numbers) **Fractions** ▪ Simplifying fractions ▪ Rewriting fractions with common denominator ▪ Addition/subtraction of fractions ▪ Multiplication/division of fractions **Powers and roots** ▪ Application of calculation rules for power ▪ Calculation using integer exponents ▪ Converting roots of integers to the standard form ▪ Converting roots of fractions to the standard form **Algebra** ▪ Substituting of values into algebraic expressions ▪ Application of priority rules ▪ Simplifying algebraic expressions with exponents ▪ Expanding brackets in algebraic expressions ▪ Factor out integers or algebraic expressions ▪ Application of the 'Banana Rule' (product of two sums of two terms) **Special products** ▪ Decomposing expressions ▪ Expanding brackets **Fractions with letters** ▪ Splitting and writing with common denominator ▪ Simplifying fractions (with letters) **First degree equations** ▪ solving first degree equations ▪ manipulating inequalities (<, <=, >, >=) ▪ reducing an equation to a first degree equation **Second degree equations** ▪ solving second degree equations ▪ solving second degree equations by completing the square ▪ applying the abc formula **Systems of first degree equations** ▪ solving systems of two equations with two unknowns ▪ solving systems of three equations with three unknowns
Details of assessments	The module is assessed using a written exam.
Strategies and	Lectures cover "this week's" topics using problems and practical examples. Students solve a number of

teaching activities	problems which are then discussed with the class. Students are expected to complete assignments (homework).	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Term 2

Management Information Systems - 1918IN121Z

Content of unit of study	Management Information Systems introduces students to a rapidly changing profession and looks at important ICT issues in 21st century business. The various types of information systems are discussed, as well as some of the topics covered are the digital integration of companies and the ways that new technologies affect modern business management. Acquisition of basic knowledge on the following topics: ▪ Strategic value of IT for companies; ▪ Types of Information Systems; ▪ Components IT infrastructure; ▪ IT trends; ▪ Enterprise software : ERP systems; ▪ CRM (customer relationship management); ▪ E-commerce; digital markets, digital products; ▪ Databases & BI (Business Intelligence) ▪ Business Process Reengineering; ▪ System development steps.
Learning outcomes	**Analyse:** ▪ 1.3 Record the data flows and information provision of a business process.(BP) **Advising**: ▪ 1.2 Advising on an ICT development's applicability for an organisation (BP); ▪ 2.3 Advising on new possibilities for the organisation on the basis of ICT developments (BP); ▪ 2.6 Advising on the prospective purchase and subsequent selection of existing software or components as part of a software system development process in which costs are a factor (SW). **Research skills**: ▪ 1.4 Using sources to solve a problem; ▪ 2.5 Gathering and processing relevant research data.
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Management Information Systems - 1918IN121A

Assessment objectives/criteria	Students are able to: ▪ Indicate the ways business management is affected by automation, the internet and web technology; ▪ Describe the components of an information system; ▪ Describe various types of information systems; ▪ Describe simple relationships between organisation, business processes and information systems;

	▪ Describe information systems supporting the main functional areas of an organisation; ▪ Explain the importance of e-commerce and e-business; ▪ Describe the characteristics of enterprise (ERP) systems; ▪ Describe the characteristics of CRM (customer relationship management) systems; ▪ Describe the characteristics of e-commerce, digital markets and digital products, and the main e-commerce business models; ▪ Describe the characteristics of BI (business intelligence); ▪ Describe the characteristics of Business Process Reengineering; ▪ Describe the steps of the information system development process.
Details of assessments	Written exam with multiple-choice and open questions. During the lecture weeks students work on assignments, which are assessed. See assingments Management Information Systems.
Strategies and teaching activities	Lecture/ seminars and independent learning.
Compulsory attendance (See also Article 115 TER)	No
Permitted aids	None.

Assessment: Assignments Management Information Systems - 1918IN121B

Assessment objectives/criteria	The student completes a series of research practice assignments and hands in a written report on the theory topics.
Details of assessments	Individual assignments.
Strategies and teaching activities	Lectures, seminars, assignments(at home and/or in class) and independent learning.
Compulsory attendance (See also Article 115 TER)	No
Permitted aids	None.

Professional Skills Year 1a - 1920IN129Z

Content of unit of study	Professional Skills helps students gain an understanding of: ▪ Themselves, their motives for doing the programme, interests, expectations, style of working and learning, way of planning and structuring their studies and way of collaboration; ▪ The programme and future job market, the competencies the programme provides training in, the different options within the programme and the possible majors; ▪ Their educational and professional career and to reflect on the experiences and the choices that can be made in this respect; ▪ The way of planning and structuring their studies and establishing a personal development plan (PDP) reflecting their own development and new insights concerning items 1 to 3.
Learning outcomes	**Competency Professionalisation** ▪ 1.1 Self-direction ▪ 1.2 Social-communicative skills ▪ 1.4 Awareness of social responsibility.
Requirements for participation in units of study (See also Article 29 TER)	None.

Specific details	All first year students join a teambuilding event. Participation in this event is mandatory and is a requirement for Professional Skills 1a or 1b. When a student is unable to participate the teambuilding event he will work at school when the event takes place on a replacing assignment. The assignment has to be finished to receive the credit for this course. For this assignment a retake will be offered.

Assessment: Professional Skills Year 1a - 1920IN129A

Assessment objectives/criteria	Students are able to: ▪ Describe their own learning needs and learning style and based on that formulate SMART objectives in a personal development plan (PDP); ▪ Express what actions they are taking in order to enhance their knowledge and skills in the areas of the programme and their future profession; ▪ Explain the tasks and responsibilities accompanying the various aspects of the programme and on the basis of this, establish and execute a suitable schedule; ▪ Explain their reasons for choosing this programme and profession to others; ▪ Reflect on their own (personal and study) experiences), their own way of working during their studies and their achieved results. **Execution**: Written and oral (assignments and discussions): students will be working on a professional skills portfolio in which the assignments and deliverables they will work on will be collected. this portfolio consists of two parts: the first part will be handed in at the end of tern 1.2; the second part at the end of term 1.4.	
Details of assessments	▪ Attendance at lectures (at least 80%) S/U ▪ Assessment discussion (grade) ▪ Written reports S/U Students only receive their grade after completing both lecture attendance and written reports with an S.	
Strategies and teaching activities	Three lectures per term, assignments and an individual talk. **Material:** ▪ Syllabus Professional Skills year 1. ▪ Roel Grit e.a.: Managing your competences.	
Compulsory attendance (See also Article 115 TER)	Yes	The professional skills classes are interactive by nature. During the classes personal experiences and assignments are discussed and shared, including providing mutual feedback and shared reflection. Because the classes revolve around the group process, all students are required to attend at least 80% of the classes. If a student has not met the compulsory attendance requirement, the course has to be repeated. Individual coaching meeting: students must attend the individual coaching at the end of the second and fourth term. If a student does not attend, a No Show assessment will be issued (1st attempt). The discussion may be repeated in the following term (2d attempt)
Permitted aids	None.	

Linux 1 - 1918IN123Z

Content of unit of	As one of the most successful open source collaborations, Linux has evolved into the most reliable

study	operating system on the planet. It's used for embedded systems to virtually all supercomputers for a good reason. Nearly every IT job requires some Linux knowledge. Linux Essentials quickly builds your Linux knowledge and prepares you for the LPI Linux Essentials Professional Development Certificate (PDC), your proof to employers that you know Linux!
Learning outcomes	Suitable for the profession
Requirements for participation in units of study (See also Article 29 TER)	**Manage**: ▪ 1.2 Layout and use a management system to support software development within a team setting (SW). **Analyse**: ▪ 1.8 Describe the architecture of a computer system. (HW)
Specific details	None.

Assessment: Linux 1 - 1918IN123A

Assessment objectives/criteria	Students have knowledge of and are able to: ▪ Introduction to Linux; ▪ Operating Systems; ▪ Working in Linux; ▪ Open Source Software and Licences; ▪ Command Line Skills; ▪ Getting Help; ▪ Navigating the Filesystem; ▪ Managing Files and Directories; ▪ Archiving and Compression; ▪ Working with Text; ▪ Basic Scripting; ▪ Understanding Computer Hardware; ▪ Where Data is Stored; ▪ Network Configuration; ▪ System and User Security; ▪ Creating Users and Groups; ▪ Ownership and Permissions; ▪ Special Directories and Files.	
Details of assessments	Written exam	
Strategies and teaching activities	Lectures and assignments (at home and/or in class) and independent learning. The lectures consist of an instructional section. The assignments are completed in class and at home.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None.	

Introduction to Modeling - 1918IN124Z

Content of unit of study	Analysis, modelling and recording of business processes and business data using commonly used UML diagram techniques
Learning outcomes	**Competency Design**:

	▪ 1.4 (SW) Design a software system with modelling techniques using a standard method.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Introduction to Modeling - 1918IN124A

Assessment objectives/criteria	Students are able to: ▪ Read and understand Use case Diagrams in order to formally communicate the requirements of a simple system; ▪ Read and understand Activity Diagrams in order to formally communicate the flow of behaviour of a system; ▪ Read and understand Class Diagrams in order to formally communicate the structure of a system; ▪ Understand and have an overview of the background of structured and of object-oriented programming; ▪ Read and understand Sequence Diagrams in order to formally communicate the sequentiality of object communication; ▪ Read and understand State Diagrams in order to formally communicate the possible states of objects.	
Details of assessments	Written multiple-choice (closed-book) exam.	
Strategies and teaching activities	Lecture/seminar After an introduction, students work on exercises relevant to the presented topics. The lecturer discusses the topics and during the class supervises the completion of a number of exercises.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Programming 2 - 1918IN126Z

Content of unit of study	In this unit students learn how to perform structured coding in C# using a development environment. The following topics are covered: ▪ Enumerations, structs and (basic) classes; ▪ 2-dimensional arrays; ▪ Strongly-typed lists and dictionaries; ▪ File I/O; ▪ Error handling and exceptions; ▪ Top/down vs bottom/up implementation of a program; ▪ SoC-principle (Separation of Concerns); ▪ SRP (Single Responsibility Principle).
Learning outcomes	**Competency Analyse:** ▪ 1.7 Analyse a simple problem and create an algorithm to solve it. (SW) **Competency Implement**: ▪ 1.3 Build and test an elementary software system and make it available. (SW)

Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Programming 2 - 1918IN126A

Assessment objectives/criteria	The assignments are used to assess the following skills: ▪ apply SoC-principle and SRP-principle; ▪ apply enumerations, structs and (basic) classes; ▪ using 2-dimensional arrays; ▪ using strongly-typed lists and dictionaries; ▪ reading from / writing to files; ▪ apply error handling / exceptions.	
Details of assessments	During the assessment students must individually implement a number of programs using C# in a development environment (Visual Studio).	
Strategies and teaching activities	Lecture and assignments	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	IDE (Visual Studio)	

Assessment: Assignments Programming 2 - 1918IN126B

Assessment objectives/criteria	See assessments objectives/criteria module “Programming 2”.	
Details of assessments	The mandatory assignments are checked partially automatically and partially manually (by practical teacher), and feedback is given on the code. If the assignments are not approved, students get a second chance in the next term.	
Strategies and teaching activities	Students start working on the mandatory assignments during the practical classes; the assignments must be handed-in at the latest in the next practical class. The assignments must be completed individually. Students may discuss their work, but are not allowed to share or copy code.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	IDE (Visual Studio).	

Term 3

Communication 1 - 1921IN131Z

Content of unit of study	*Communication 1 consists of two modules:* *Interviewing and Report Writing: the student learns the basics of exploratory research in preparation for the project in Term 4. This includes preparing and conducting interviews, consulting written sources, and*

	writing a report based on the collected information. It is an individual assignment. *English language test: the student must demonstrate a sufficient command of the English language to followa degree programme in English (CEFR B2+). Students who do not demonstrate this level are expected to take the language course organised by the faculty and actively work on their language skills.*
Learning outcomes	The indicators below will be evaluated in a formative or summative way. **Professionalisation**: 6.1.1 Self-direction ▪ Is able to operate in critical situations in an independent, results-oriented and stress-free manner. ▪ Is capable of planning and organising, monitoring milestones and deadlines, and honours commitments. ▪ Is able to identify, integrate and apply relevant knowledge and insights in every new situation. 6.1.2 Social-communicative skills ▪ Is able to communicate effectively with people in various positions/roles. ▪ Is able to listen to and empathise with another person's point of view. ▪ Is able to communicate knowledge, insights and skills to others. ▪ Expresses him/herself effectively, orally and in writing, using correct, understandable and appropriate language. **Research skills**: ▪ 7.1.2 Formulate possible solutions to identified problems. ▪ 7.1.4 Use sources when approaching a problem ▪ 7.1.5 Process the provided and collected information
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Linguistic Test: English - 1918IN131A

Assessment objectives/criteria	The student: ▪ Has knowledge of the rules for spelling and punctuation and is able to apply these; ▪ Understands matters regarding word choice and sentence structure; ▪ Has adequate vocabulary. Students are expected to have a command of the English language in accordance with the requirements for Universities of Applied Sciences (HBO). This exam is intended to test this basic level of competency in English, and the aim of the module is to strengthen this basic level when necessary.	
Details of assessments	Written exam **Note:** the exam is offered four times during the academic year, at the end of every term. Passing the exam at the end of Term 1 or Term 2 exempts the student from attending the classes organised for Term 3, and from sitting the exam of Term 3 and 4.	
Strategies and teaching activities	During the course, grammar, vocabulary, reading and Use of English will be practised in the fashion of Cambridge English tests. The lessons will be interactive with plenty of opportunities for language practice and asking questions. Regular practice at home is strongly advised. **Materials**: ▪ Davies, Paul, Falla, Tim (2014) *Cambridge English First Result: Student's Book and Online Practice Pack.* UK, Oxford University Press. ▪ Handouts on Moodle 14 contact hours: Seminars of 90 minutes.	
Compulsory attendance (See also Article 115 TER)	No	Attendance 80%

Permitted aids	None

Assessment: Interviewing and Report Writing - 1918IN131B

Assessment objectives/criteria	Two semi-structured interviews will be taken in order to obtain information regarding the project which will be carried out in Term 4. In advance a scenario will be written and at least one publication will be consulted. The scenario is subject to a go/no go-decision for the execution of the interview. During the classes attention is paid to: instructions for tasks to be performed, feedback on intermediate products (such as the scenario) and practical exercises, such as role plays. Most important learning objectives are: ▪ Becoming acquainted with basic research skills such as interviewing and processing information from written sources; ▪ Improving professional communicative skills, both verbal and written. The student demonstrates that he or she is capable of writing a report that meets the following requirements: ▪ The content is obtained from two oral source (interviews) and two written sources; ▪ The information (data) is collected, selected and organised in a systematic way; ▪ Structure and lay-out are in accordance with conventions of a research report; ▪ Language use is comprehensible, adequate and correct; ▪ The APA-guidelines are applied; ▪ The length is approximately 2500 words (table of content, list of references and appendixes not included).
Details of assessments	In preparation for the interview a student creates a scenario. Scenarios are assessed with a Go/No Go. A Go needs to be obtained before conducting the interviews. The student submits a written report based on the interviews. This written assignment is graded. The result will be determined within 15 working days of the date of the examination (See also Article 131 of the TER).
Strategies and teaching activities	There are six lectures/seminars, during which: Instructions are provided for the tasks the students need to perform: ▪ Creating a scenario, conducting the interview and writing an interview report; ▪ Interview techniques are practised; ▪ Methods for collecting data from sources and writing reports are discussed; ▪ Feedback is given on concept assignments. **Materials**: ▪ Grit, R. (2019*). Project Management. A Practical Approach.* Groningen: Noordhoff. ▪ 't Hart, M., Leen, E. & Wisselink, I. (2018). *Interviewing. Student Manual Information Technology*. Haarlem: Inholland University. ▪ Materials to be found on Moodle. 12 contacthours: Lectures
Compulsory attendance (See also Article 115 TER)	Yes
Permitted aids	Pay attention: this part has to be rounded off before students can start with the internship.

Assessment: Dutch Language and Culture - 1921IN131C

Assessment objectives/criteria	In this course, international students will learn basic Dutch vocabulary and grammar and will acquire insights into Dutch culture. Tools are made available to students to further develop their Dutch speaking and writing skills independently. The course is aimed at reaching an elementary level of reading and listening skills (CEFR A1). After completing this course, students can understand non-specialist written and spoken Dutch, for instance in magazines, on television, or the Internet. Students develop their vocabulary in Dutch and study essential grammar. The various texts and sources used in the course are specifically aimed at introducing students to Dutch, and Flemish, culture and society.

Details of assessments	Students form groups and discuss the main challenge(s) for international students and expats living in the Netherlands. This discussion can be approached from a cultural or from a linguistic perspective. Students elaborate on their chosen discussion topics and write an essay (circa 1000words) on it referring to at least two external sources to support or illustrate their stance. In addition to the essay, there will be an obligatory vocabulary test at the end of the period. The Dutch word list will be made available at the beginning of the lesson period and will be updated and finalized by the end of the period. The result of the test and the assessment of the essay will be the basis of a “V” (pass) or “OV” (fail) for this course.
Strategies and teaching activities	In the various classes, students practise their reading and other language skills using texts and exercises about Dutch culture and society. Listening exercises make use of media clips about current affairs. Classes also pay attention to explaining basic grammar and offer opportunities to improve speaking skills. In preparation for class, students prepare small quizzes. Students are expected to independently improve their vocabulary, to take part in listening comprehension exercises, and to exercise grammar. Language proficiency classes are relatively intensive and require considerable preparation time and independent study. The course emphasizes reading skills, followed by elementary listening and speaking skills. These are mixed with a strong focus on Dutch culture and society. **Materials:** www.learndutch.org www.dutchgrammar.com https://npokennis.nl/program/13/net-in-nederland “New to The Netherlands” www.hofstede-insights.com/
Compulsory attendance (See also Article 115 TER)	Yes — Attendance 80%
Permitted aids	None

Databases - 1916IN133Z

Content of unit of study	This unit covers the following subjects: ▪ Data Modelling; ▪ Data Models and Database Design. Topics covered include: ▪ Entities, attributes and relationships (ERDs); ▪ Functionality and Totality of Relationship = A Relationship; ▪ Rules of conversion to a relational database model.
Learning outcomes	**Competency Analyse:** ▪ 1.6 (SW) Analyse and solve a simple mathematical problem. **Competency Design**: ▪ 1.4 (SW) Design a software system with modelling techniques using a standard method. **Competency Implement**: ▪ 1.3 (SW) Build and test an elementary software system and make it available.

Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Databases (SQL) - 1912IC136A

Assessment objectives/criteria	Students are able to: ▪ Apply the basic operators (negation, conjunction, disjunction, implication, equivelance) from logic theory using truth tables; ▪ Apply basic operations and notation from set theory; ▪ Differentiate between DDL and DML queries; ▪ Retrieve information from a database using SELECT (DISTINCT), FROM, WHERE, GROUP BY, HAVING, JOIN, and/or a subselect; ▪ Create a simple database or adjust a database using CREATE, DROP, ALTER, INSERT, DELETE statements, using the referential integrity rules, and foreign key rules.	
Details of assessments	Written exam.	
Strategies and teaching activities	Lectures/ seminars	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None.	

Assessment: Datamodeling (ERD) - 1912IC128A

Assessment objectives/criteria	Students are able to: ▪ Distil data groups from a general description; ▪ Define and describe relationships between data groups; ▪ Specify the functionality and totality of relationships; ▪ Identify specialisation/generalisation links (= a relationship); ▪ Design a basic relational database based on an ERD; ▪ Normal Forms.	
Details of assessments	Written exam.	
Strategies and teaching activities	Lectures/seminars	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None.	

Programming 3 - 1918IN133Z

Content of unit of study	Students will learn how to program in an object-oriented language and will learn several OO-priciples (Abstraction, Inheritance, Polymorphism and Encapsulation). Students will also learn how to separate an application into several layers: a userinterface layer, a logic layer and a database layer.
Learning outcomes	**Competency Analyse**:

	▪ 1.7 Analyse a simple problem and create an algorithm to solve it. (SW) **<u>Competency Implement</u>**: ▪ 1.3 Build and test an elementary software system and make it available. (SW)
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Programming 3 - 1918IN133A

Assessment objectives/criteria	Students know the following basic principles and concepts of Object Orientation and are able to correctly describe/recognise and use them in an application: ▪ Base classes; ▪ Derived classes; ▪ Constructors; ▪ Access modifiers; ▪ Properties; ▪ Virtual/override methods; ▪ Abstract classes; ▪ Interfaces. The student can correctly apply the following OO-principles: ▪ Abstraction; ▪ Inheritance; ▪ Polymorphism; ▪ Encapsulation. The student is capable of dividing an application into several layers in order to separate userinterface, logic and database code.	
Details of assessments	Students must implement (individually) a number of assignment in C# with a development environment (Visual Studio).	
Strategies and teaching activities	Lectures and assignments.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	IDE (Visual Studio).	

Assessment: Assignments Programming 3 - 1918IN133B

Assessment objectives/criteria	See test criteria module “Programmning 3”.	
Details of assessments	The mandatory assignments are checked partially automatically and partially manually (by practical teacher), and feedback is given on the code. If the assignments are not approved, students get a second chance in the next term.	
Strategies and teaching activities	Students start working on the mandatory assignments during the practical classes; the assignments must be approved at the latest in the next practical class. The assignments must be completed individually. Students may discuss their work, but are not allowed to copy code from others not share code with others.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	IDE (Visual Studio).	

Project Database - 1921IN138Z

Content of unit of study	The students must develop a software layer, All database abstractions are to be implemented by the student (data abstraction layer). We work with an existing database, structure and content are given. To visualize information, a simple application is offered that the students must complete. Students must make use of a true software layer. We work in a group of preferably 3 students.
Learning outcomes	**Competency Professionalisation**: ▪ 1.1 Self-direction; ▪ 1.2 Social- communicative skills; ▪ 1.3 Creativity and problem solving skills ; ▪ 1.4 Awareness of social responsibility. **Competency Research skills**: ▪ 1.3 Handle a problem in a systematic way; ▪ 1.4 Use sources when approaching a problem; ▪ 1.5 Process the provided and collected information.
Requirements for participation in units of study (See also Article 29 TER)	No specific requirements
Specific details	None.

Assessment: Project Database - 1916IN138A

Assessment objectives/criteria	Correct implementation of database queries in code; Correct implementation of database approach; Correct coupling of software layers.	
Details of assessments	Individually written (no sitting) based on the delivered code.	
Strategies and teaching activities	6 Contacthours: ▪ Project supervision in project groups ▪ Substantive supervision during consultation meetings	
Compulsory attendance (See also Article 115 TER)	Yes	Insufficient contribution to or obstruction of group work may be penalised. In the first instance students receive a warning, a second breach leads to a yellow card and a third breach to ejection from the project group (red card). For further details of the disciplinary policy, please refer to the project manual and the relevant Moodle Course.
Permitted aids	Computer, software	

Assessment: Process dossier - 1921IN138B

Assessment objectives/criteria	On completion of this module, students are able to: 1. List a project ‘s features; 2. List the tasks, responsibilities and roles of the people working on a project; 3. Indicate how a project should be organised and managed; 4. List channels of communication within the project; 5. List requirements for collaboration in groups; 6. List the main principles, terms and concepts regarding project work and translate these to a real-life

	context.	
Details of assessments		
Strategies and teaching activities	6 Contacthours: ▪ Three lectures process dossier (introduction), combined with project tutoring	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Project Management 1 - 1921IN135Z

Content of unit of study	This course consists of two parts: 1. Lectures project management in which students acquire knowledge and understanding of the basic concepts of and relating to project work and the various aspects of project management 2. During the lectures Project skills, related to the project tutoring students acquire skills related to working in project teams, like setting individual goals, working on a team contract, writing a project plan, making a project file and teamwork in general. The acquired skills through lectures will be assessed during the project tutoring of term 1.4 in writing a project plan.
Learning outcomes	**Competency Professionalisation**: ▪ 1.1 Self-direction. **Competency Research skills**: ▪ 1.1 Map out the relevant aspects of a simple problem. ▪ 1.3 Handle a problem in a systematic way. ▪ 1.5 Process the provided and collected information
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Projectmanagement 1 - 1918IN135A

Assessment objectives/criteria	1. List the main principles, terms and concepts regarding project work and translate these to a real-life context.	
Details of assessments	On completion of this module, students are able to: 1. List the features of a project. 2. Name the tasks, responsibilities and powers of people in a project. 3. Indicate how a project should be organised and controlled. 4. Name the channels of communication within the project. 5. List the prerequisites for collaboration in groups. 6. Students know the main terms and concepts with regard to project work and are able to translate these to a practical setting. 7. The student has knowledge of the system development methods and is able to use them in projects. Written exam for the part Project management based on the book Project management by Roel Grit e.a. and sheets used in the lessons	
Strategies and teaching activities	Seven lectures on project management/system development	
Compulsory attendance (See	No	

also Article 115 TER)		
Permitted aids	None.	

Term 4

Routing - 1916IC141Z

Content of unit of study	Switching, Routing, and Wireless Essentials (SRWE) covers the architecture, components, and operations of routers and switches in small networks and introduces wireless local area networks (WLAN) and security concepts. Students learn how to configure and troubleshoot routers and switches for advanced functionality using security best practices and resolve common issues with protocols in both IPv4 and IPv6 networks.
Learning outcomes	**Competency Design:** ▪ 1.3 (IS) Draw up specifications for a local infrastructure according to a standard method. **Competency Implement**: ▪ 1.2 (IS) Layout and test a local infrastructure and make it available.
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Routing (CCNA 2) - 1912IC141A

Assessment objectives/criteria	By the end of the course, students will be able to: ▪ Configure VLANs and Inter-VLAN routing applying security best practices. ▪ Troubleshoot inter-VLAN routing on Layer 3 devices. ▪ Configure redundancy on a switched network using STP and EtherChannel. ▪ Troubleshoot EtherChannel on switched networks. ▪ Explain how to support available and reliable networks using dynamic addressing and first-hop redundancy protocols. ▪ Configure dynamic address allocation in IPv6 networks. ▪ Configure WLANs using a WLC and L2 security best practices. ▪ Configure switch security to mitigate LAN attacks. ▪ Configure IPv4 and IPv6 static routing on routers.	
Details of assessments	Students complete a multiple-choice test.	
Strategies and teaching activities	15 Contacthours: Lecture ▪ 6 lectures (2,25 hour) ▪ 1 exam (1,5 Hour)	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	During the exam students are allowed to use pen and paper	

Assessment: Routing Practical - 1916IC141B

Assessment objectives/criteria	Students who complete the Switching, Routing and Wireless Essentials course will be able to perform the following functions: ▪ Configure VLANs and Inter-VLAN routing applying security best practices. ▪ Configure dynamic address allocation in IPv6 networks. ▪ Configure switch security to mitigate LAN attacks. ▪ Configure IPv4 and IPv6 static routing on routers.	
Details of assessments	Students complete a practical test (Pass/Fail)	
Strategies and teaching activities	Students apply what they have learned in a practical class. 11 Contacthours: ▪ 6 workshops (1,5 Hour) ▪ 1 Skills Test (2 Hour)	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	During the exam students are allowed to use pen, paper, PowerPoint Slides and Command List.	

Interaction Design - 1917IN142Z

Content of unit of study	The starting point for interaction design is understanding and practicing user centered design. This means optimizing the functionality and flow of an application, taking into account the context of use and the target user group. By focusing on the user, right from the start and investigating what cognitive factors, attitude, behavior and expectations are important to a user, interaction designers provide important input and an essential contribution to the development and creation of a good product. The classes look at the following topics: ▪ Introduction to Interaction Design; ▪ Debrief and prioritization using the MoSCoW method; ▪ Personas; ▪ Scenario based design and (Paper) Prototyping ; ▪ Evaluation of the prototype based on Expert evaluation and Usertesting; ▪ Redesign.
Learning outcomes	**Competency Analyse:** ▪ 1.1 Catalogue the design repertoire(shape, colour, stylistic features) and describe the brand or prouct identify of a current ICT and/ or digital media product (UI); ▪ 1.2 Identify target groups and objectives and link these to user behaviour and interaction (UI); ▪ 1.3 Record the data flows and information provision of a business proces (BP); ▪ 1.4 Analyse the bottlenecks within a business process and describe the cause effect relationship (BP); ▪ 2.2 Analyse interface, usage and communication including usability and user experience (UI). **Competency Design**: ▪ 1.4 Design a software system with modelling techniques using a standard method (SW). **Competency Implement**: ▪ 1.1 Implement and test static ICT and/ or digital media products, using standard tools, a range of suitable (media) formats, and a limited usage of stylistic devices (UI).

Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	Tools and literature that will be used during this course will be published on Moodle.

Assessment: Interaction Design - 1913IC142A

Assessment objectives/criteria	The student demonstrates understanding in the user centered design and the communication driven-design process: Assessment components and weighting: ▪ Exam (individual knowledge test) 50%; ▪ A satisfactory grade is required for both the exam and the design document.	
Details of assessments	Written test with multiple-choice on the theory covered.	
Strategies and teaching activities	Lecture/seminar Classes consist of a theoretical section and practical assignments.	
Compulsory attendance (See also Article 115 TER)	Yes	
Permitted aids	For the written exam, no aids are permitted.	

Assessment: Design document - 1917IN142B

Assessment objectives/criteria	Students are able to: ▪ Complete a user requirements analysis based on a briefing and research; ▪ Define one or more target groups based on a briefing and research; ▪ Design and justify functionality matching the user requirements, task analysis and defined target groups; ▪ Using a user scenario to create a suitable UI and workflow design and using the scenario correctly for user testing. ▪ Create a (Paper) Prototype (mock-up): visualisation of the user interface, interactions and processes associated with the defined functionalities and target groups; ▪ Apply a Heuristic Analysis (J. Nielsen) to the prototype: characterise application methods for problems and errors and define one or more solutions; ▪ Complete and justify a redesign and iteration. Assessment components and weighting: ▪ Design document /prototype (group assignment) 50%; ▪ Asatisfactory grade is required for both the exam and the design document.	
Details of assessments	Design document consolidating the various elements and explaining the design. Completing a user test/expert evaluation, recording the findings and adjusting the design are all part of the design document.	
Strategies and teaching activities	Lecture/seminar Classes consist of a theoretical section and practical assignments.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Computer, and required software for making the assignments.	

Communication 2 - 1918IN143Z

Content of unit of study	In this study unit students improve their communication skills regarding professional communication. one of the subjects that will be addresses during this term is presentation skills. During the lectures students improve their presenting skills by doing short and creative assignments concerning public speaking/ presenting in class. A final individual presentation of 7 to 10 minutes will complete this study unit. Feedback is an important part of the project, not only from the lecturer but also from peers. The final project presentation will be assed at the end of this term and will be assessed by the communication lecturer. Both parts need to be passed to round off this course.
Learning outcomes	**Professionalisation**: 1.1 Self-direction ▪ Recognises personal focus points and formulates learning goals based on feedback and self-reflection. ▪ Takes personal duties and responsibilities seriously. 1.2 Social-communicative skills ▪ Is able to communicate knowledge, insights and skills to others. ▪ Is able to give and receive feedback. ▪ Expresses him/herself effectively, orally and in writing, using correct, understandable and appropriate language. 1.3 Creativity and problem-solving skills ▪ Comes up with new ideas, approaches or insights. ▪ Research skills ▪ 1.1 Map out the relevant aspects of a simple problem. ▪ 1.4 Use sources when approaching a problem.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Presentation - 1918IN143A

Assessment objectives/criteria	The student is able to: ▪ Use audio visual tools like PowerPoint or Prezi during a 7- to 10-minute presentation; The PowerPoint/ Prezi presentation has a clear and logic structure including an index; ▪ Use proper verbal- (language, intonation, volume, interaction) as well as non-verbal (eye contact, posture, body language, mimic) communication to engage the audience; ▪ Interact with the audience and keep their interest throughout the presentation; ▪ During this study unit, students monitor their improvements/ developments closely on an assessment form, on which feedback is written. The student takes the feedback and learning perspectives into account. Based on this assessment form the student is able to write a reflection, which shows his/ her development.	
Details of assessments	An individual presentation as well as being able to present as a group, in which every team member is responsible for a part of the presentation.	
Strategies and teaching activities	Seminars	
Compulsory attendance (See also Article 115 TER)	Yes	Attendance during the lectures is vital in order to monitor the development and assessed accordingly based on the feedback given during the seminars.
Permitted aids	None	

Design Patterns - 1918IN144Z

Content of unit of study	Introduction to (software) design patterns and realisation. The following subjects will be discussed: ▪ Abstract classes/ abstract methods ▪ Interfaces ▪ Template pattern ▪ Observer pattern ▪ MVC pattern ▪ Strategy pattern ▪ Adapter pattern ▪ Singleton pattern ▪ State pattern ▪ Factory pattern
Learning outcomes	**Analyze:** ▪ 1.7 Analyse a simple problem and create an algorithm to solve it. (SW) **Implement**: ▪ 1.3 (SW) Build and test an elementary software system and make it available.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Design Patterns - 1918IN144A

Assessment objectives/criteria	The student is able to recognize a number of Design Patterns and implement them correctly in an application. Based on specific context the student is capable of selecting the right pattern and implement it.	
Details of assessments	The module is assessed with a practical exam, in which, a student individually completes a set of assignments in C# with Visual Studio. In the assignments you will be asked to compile a specific feature (for example a simple plugin of 'new behaviour' or isolate an object-creation) in which the student is able to select the correct Design Pattern and is able to implement it as well.	
Strategies and teaching activities	Lectures and assignments.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	IDE (Visual Studio)	

Assessment: Assignments Design Patterns - 1918IN144B

Assessment objectives/criteria	The student is able to recognize a number of Design Patterns (see module guide for details) and apply them correctly (implement) in an application. Based on specific context the student is capable of selecting the right pattern and implement it.	
Details of assessments	The mandatory assignments will be reviewed during the practical classes. If the assignments are not approved, students get a second attempt in the next term.	
Strategies and teaching activities	Students start working on the mandatory assignments during the practical classes, and receive feedback on their work; the completed assignments must be approved at the latest in the next practical class. The assignments must be completed individually. Students may discuss their work, but are not allowed to copy code from others not share code with others.	
Compulsory attendance (See	No	

also Article 115 TER)	
Permitted aids	IDE (Visual Studio)

Project Building applications - 1921IN145Z

Content of unit of study	Analyzing, designing and building an object-oriented application with an underlying SQL database in a group context, where project documentation is maintained.
Learning outcomes	**Manage**: ▪ 1.2. Setting up and using a management system to support software development in a team (SW). **Analyze**: ▪ 1.5. Collecting and validating functional requirements for a software system with one stakeholder and according to a standard method (SW). **To design**: ▪ 1.4. Create a design for a software system with modeling techniques according to a standard method (SW). **Realization**: ▪ 1.3. Build, test and make available a simple software system (SW). **Professionalize**: ▪ 6.1.1 Self-managing ability; ▪ 6.1.2 Social communicative competence; ▪ 6.1.3 Creativity and problem-solving skills; ▪ 6.1.4 Awareness of social responsibility.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None.

Assessment: Building applications - 1918IN145A

Assessment objectives/criteria	The student is able to: ▪ Build a simple object-oriented information system (using a database), test it and make it available; ▪ Demonstrate that he/she has made a relevant contribution to the project by indicating which parts he/she has developed himself/herself; ▪ Demonstrate that he/she actually developed the above-mentioned components himself/herself by explaining how they work and answering questions about them; ▪ Explain and substantiate how he/she arrived at the choice of certain programming solutions; ▪ Explain the OO concepts used (classes, inheritance, properties, access modifiers,…); ▪ Explain the software architecture/layers; ▪ Explain the database components (connection, SQL queries,…); ▪ Write clear, logical and efficient code. The student is also able to: ▪ Set up an application that uses a layered architecture; ▪ Implement a graphical user interface, using a universal corporate identity through inheritance.

Details of assessments	During an individual code assessment, the student demonstrates his/her developed part of the application and answers questions about it.	
Strategies and teaching activities	The student receives project supervision and project consultancy every two weeks.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, please refer to the project manual and the relevant Moodle Course.
Permitted aids	PC, required software	

Assessment: Project documentation - 1918IN145B

Assessment objectives/criteria	The student can: ▪ Using an entity relations diagram (ERD), create a design for the relational database used in the project; ▪ Using use case descriptions and use case diagrams (UML) to clarify the interaction between users and system; ▪ Using a class diagram (UML) to clarify the hierarchy and structure of the code.	
Details of assessments	Written task; Hand-in on Moodle	
Strategies and teaching activities	The student receives project consultancy every two weeks.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, please refer to the project manual and the relevant Moodle Course.
Permitted aids	PC, required software	

Assessment: Process dossier - 1919IN145C

Assessment objectives/criteria	The students draw up a cooperation agreement in a group context. The students by turns make the agenda and minutes of the project supervision meetings. In addition, the students reflect on the development of their (project) skills and those of their fellow students by means of evaluation forms (peer and self-evaluation)
	Test criteria,
	
	▪ Active contribution to all project management meetings completeness of the following documents (on Moodle):
	  ▪ Collaboration agreement
	  ▪ Agenda and minutes
	  ▪ Retro evaluation form
	  ▪ Project plan sufficient/insufficient	

Details of assessments	Required documents must be handed-in and sufficient.	
Strategies and teaching activities	The student receives project supervision every two weeks.	
Compulsory attendance (See also Article 115 TER)	Yes	Failing to cooperate or deliberately failing to cooperate or work together as a team will be met accordingly with sanctions to those involved. First Sanction/ penalty is a warning. Second sanction/ penalty is a yellow card. Third sanction/ penalty is a red card, which means you will be disqualified from the project. The project member will be led before the exam commission to be expelled from the project. This also means the student has a fail and will have to resit/ retake the

		project/ exam.
Permitted aids	PC, required software	

Professional Skills Year 1b - 1920IN147Z

Content of unit of study	Professional skills helps students gain an understanding of: ▪ Themselves, their motives for participating in the programme, interests, expectations, style of working and learning, way of planning and structuring their studies and way of collaboration; ▪ The programme and future professional career, the competencies the programme provides training in, the different options within the programme and the possible majors; ▪ Their educational and professional career and to reflect on the experiences and the choices that can be made in this respect; ▪ The way of planning and structuring their studies and writing a personal development plan (PDP) reflecting their own development and new insights concerning items 1 to 3. In term 4 a guest lecture provides students with an overview of the job options in their profession (labour market orientation).
Learning outcomes	**Competency Professionalisation**: ▪ 1.1 Self-direction; ▪ 1.2 Social-communicative skills; ▪ 1.4 Awareness of social responsibility.
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	All first year students join a teambuilding event. Participation in this event is mandatory and is a requirement for Professional Skills 1a or 1b. When a student is unable to participate the teambuilding event he will work at school when the event takes place on a replacing assignment. The assignment has to be finished to receive the credit for this course. For this assignment a retake will be offered.

Assessment: Professional Skills Year 1b - 1920IN147A

Assessment objectives/criteria	Students are able to: ▪ Describe their own learning needs and translate these into SMART objectives in a personal development plan (PDP); ▪ Systematically work on their own academic and professional development concerning knowledge, skills and attitude; ▪ Reflect on their own (personal and study) experiences, their own way of working during their studies, their achieved results and their own performance as a team member based on feedback; ▪ Take action in order to enhance their knowledge and skills in the areas of the programme and their future profession; ▪ Discuss work experiences and their own performance with fellow students and learn from that; ▪ Adjust their performance as a team member to others within the team and within the organisation based on feedback; ▪ Create a team profile based on guidelines; ▪ List the requirements demanded of a professional in the professional area; ▪ Based on professional requirements, feedback and reflection choose a direction within the professional area; ▪ Collect their results in a personal portfolio.

Details of assessments	Written and oral (assignments and discussions): ▪ Attendance at lectures (at least 80%) S/U (Satisfactory/Unsatisfactory); ▪ Assessment discussion (grade); ▪ Written reports S/U. Students only receive their grade after completing both lecture attendance and written reports with an S.	
Strategies and teaching activities	Three lectures per term, assignments and an individual talk. **Material:** ▪ Syllabus Professional Skills year 1. ▪ Roel Grit e.a.: Managing your competences. Assessment discussion: students must attend their assessment discussion. If a student does not attend, a No Show assessment will be issued (1st attempt). The discussion may be repeated in the resit period (2d attempt).	
Compulsory attendance (See also Article 115 TER)	Yes	The professional skills classes are interactive by nature. During the classes personal experiences and assignments are discussed and shared, including providing mutual feedback and shared reflection. Because the classes revolve around the group process, all students are required to attend at least 80% of the classes. If a student has not met the compulsory attendance requirement, a substitute assignment will be issued. Individual coaching meeting: students must attend the individual meeting. If a student does not attend, a No Show assessment will be issued (1st attempt). The discussion may be repeated in the resit period (2d attempt). Insufficient contribution to or obstruction of group work may be penalised. In the first instance students receive a warning, a second breach leads to a yellow card and a third breach to ejection from the project group (red card). For further details of the disciplinary policy, please refer to the project manual and the relevant Moodle Course.
Permitted aids	None.	

Year 2

Basic curriculum

Term 1

Java Fundamentals - 1917IN232Z

Content of unit of study	This study unit pays specific attention to learning how to program in the Programming language Java and consolidate the general basics of OO-programming-skills. Discussed subjects: Java ▪ Switch from C# to Java ▪ GUI-programming with JavaFX

	▪ Serialization and I/O ▪ Collections ▪ Exception handling OO-skills ▪ Apply Inheritance, Polymorphism and Encapsulation using classes and interfaces
Learning outcomes	**Implement**: ▪ 2.3 Build and make available a software system consisting of multiple subsystems, and using existing components. (SW)
Requirements for participation in units of study (See also Article 29 TER)	None. This module builds on the knowledge gained in the courses Programming 1, Programming 2, Programming 3 and Design Patterns.
Specific details	None

Assessment: Java Fundamentals - 1917IN232A

Assessment objectives/criteria	The students implement a windowed Java- application using the discussed Java-concepts. The student used the following features correctly: ▪ JavaFX ▪ Inheritance ▪ Polymorphism ▪ Encapsulation ▪ Collections	
Details of assessments	Students take an individual exam. Prior to the exam students are asked to prepare an end assignment. During the exam the student will be asked to develop several new features for the assignment.	
Strategies and teaching activities	During the lectures, theory will be discussed in combination with practice seminars. The end assignment is compulsory homework.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Computer, specific software, internet	

IT Service Management - 1919IN231Z

Content of unit of study	ITIL is the international standard method for the management of the technical infrastructure or IT Service Management. In this module the student is becoming aware and is practicing the most important aspects of IT Service Management and ITIL. Topics covered are: The basic concepts and functions of IT Service Management; The concepts, phases and coherence of the Service life cycle; Principles of the phases of ITIL framework for IT Service Management: ▪ Service Lifecycle; ▪ Service Strategy; ▪ Service Design; ▪ Service Transition; ▪ Service Operation . Target of the project : creating an advisory report to set up the management of the technical infrastructure

	for an organisation. In doing so ITIL knowledge from the IT Service Management theory is applied in a practical situation.
Learning outcomes	**Competency Manage**: ▪ 1.1 (IS) Document standard management processes and standard operating procedures for the purpode of infrastructure management; ▪ 2.1 (IS) Implement management processes. **Competency Analyse**: ▪ 2.4 (IS) Analyse infrastructure related incidents, problems and security threats. **Competency Advise**: ▪ 1.1 (BP) Formulate improvements regarding organisation (structure) , (business) process structure and/or information provision, based on bottlenecks analysed within a business process whilst considering ICT facilities. ▪ 2.4 (IS) Advise in the infrastructure layout and management providing informed choices based on functional and non- functional requirements, on available technology, and on management models and methods. **Competency Design:** ▪ 2.2 (IS) Describe management processes and agreements concerning the delivery of services. **Competency Professionalisation:** ▪ 1.1 Self-direction ▪ 1.2 Social-communicative skills ▪ 1.3 Creativity and problem sloving skills ▪ 1.4 Awareness of social responsibility **Competency Research skills**: ▪ 1.1 Map out the relevant aspects of a simple problem; ▪ 1.2 Formulate possible solutions to identified problems; ▪ 1.3 Handle a problem in a systematic way; ▪ 1.4 Use sources when approaching a problem; ▪ 1.5 process the provided and collected information; ▪ 1.6 Defend choices made regarding the final result.
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	

Assessment: IT Service management theory - 1918IN231A

Assessment objectives/criteria	The student is able to: ▪ Describe the basic concepts and functions of IT Service Management. ▪ Describe the concepts, phases and coherence of the Service lifecycle. ▪ Describe the principles of the Service Strategy Phase and the Continuous ▪ Service improvement Phase. Concerning the Service Design Phase describe the principles of: ▪ Service Catalog management ▪ Service Level Management ▪ Capacity management ▪ Availibility management ▪ IT Service Continuity Management. Concerning the Service Transition Phase describe the principles of: ▪ Change management ▪ Service Asset & Configuration management

	▪ Release & Deployment Management. Concerning the Service Production Phase describe the principles of: ▪ Event management ▪ Incident Management ▪ Request Fulfillment ▪ Problem management ▪ Access Management. - explain the IT Service Management discipline. - name the key concepts of IT Service Management. - appoint the objectives and principles of the ITIL method. - explain the Application Management discipline. - appoint the objectives and principles of the ASL method. - explain the Functional Management discipline. - appoint the objectives and principles of the BISL method.	
Details of assessments		
Strategies and teaching activities	Lectures	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Assessment: Project IT Service Management - 1918IN231B

Assessment objectives/criteria	Apply acquired ITIL knowledge from the It Service Management theory lectures in a practical situation, involving: ▪ Analysing the technical infrastructure of an organization ▪ Analyzing the Application Management process ▪ Advising on implementation of relevant ITIL and ASL processes ▪ creating a Service Level Agreement ▪ creating vacancies for the advised ITIL/ASL functions	
Details of assessments	Report	
Strategies and teaching activities	Group assignment (group setup is determined in the first week). Consultation sessions.	
Compulsory attendance (See also Article 115 TER)	Yes	Consultation sessions are subject to mandatory attendance
Permitted aids	None	

Assessment: Process dossier - 1919IN231C

Assessment objectives/criteria	The students draw up a cooperation agreement in a group context. The students by turns make the agenda and minutes of the project supervision meetings. In addition, the students reflect on the development of their (project) skills and those of their fellow students by means of the retro evaluation form. **Test criteria**: ▪ Active contribution to all project management meetings. Completeness of the following documents (on Moodle): ▪ Collaboration agreement ▪ Agenda and minutes ▪ Retro evaluation form
Details of assessments	2 Contacthours: Projectmanagement

Strategies and teaching activities		
Compulsory attendance (See also Article 115 TER)	Yes	Compulsory attendance and active participation in all project activities applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient active contribution and participation in the project can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual.
Permitted aids	None.	

NoSQL - 1920IN233Z

Content of unit of study	The following study components are dealt with in NoSQL: NoSQL Project and NoSQL Theory. The following topics are dealt with in NoSQL Theory: ▪ Introduction to NoSQL; ▪ Differences compared to traditional relational databases ▪ Various standard software in the field of NoSQL (eg Cassandra, HBase, MongoDB, Redis, Oracle NoSQL); ▪ Differences within NoSQL between Key-Value Cache, Key-Value Store, Key-Value Store (Eventually-Consistent), Key-Value Store (Ordered), Data Structures Server, Tuple Store, Object Database, Document Store, Wide Column Store , Native Multi-model Database; ▪ Examples of practical applications in the field of NoSQL; ▪ Various scientific studies and articles in the field of NoSQL; ▪ In NoSQL Project the student is given the opportunity to work on a NoSQL project through a series of assignments.
Learning outcomes	**Design** ▪ 2.3 Set up a technical design for the use of an infrastructure, including related security measures based on functional and non-functional requirements. (IS) ▪ 2.4 Set up a functional design for a software system, taking into account the existing components and libraries, and using quality criteria of design. (SW) **Implement** ▪ 2.3 Build and make available a software system consisting of multiple subsystems, and using existing components. (SW).
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: NoSQL Project - 1918IN233A

Assessment objectives/criteria	The student is able to: ▪ Solve aspects of a problem or problem with NoSQL; ▪ Create a design for an application that uses NoSQL as a data storage technique; ▪ Realize a created design for a NoSQL application; ▪ Create, query, empty and fill a NoSQL database from application code; ▪ Make an existing application, which uses relational databases, work with a NoSQL database.
Details of assessments	
Strategies and teaching activities	Consultancy, tutoring, workshops.

Compulsory attendance (See also Article 115 TER)	Yes	
Permitted aids	PC, required software, reader and internet.	

Assessment: NoSQL Theorie - 1918IN233B

Assessment objectives/criteria	The student is able to: ▪ describe the NoSQL concept; ▪ clarify the differences between NoSQL and relational databases; ▪ make recommendations based on a case how to apply NoSQL; ▪ identify various advantages and disadvantages of using NoSQL; ▪ provide examples of practical applications of NoSQL; ▪ conduct research into and become acquainted with NoSQL in scientific journals and articles; ▪ indicate differences within NoSQL between Key-Value Cache, Key-Value Store, Key-Value Store (Eventually-Consistent), Key-Value Store (Ordered), Data Structures Server, Tuple Store, Object Database, Document Store, Wide Column Store, Native Multi-model Database.	
Details of assessments		
Strategies and teaching activities	Lectures and seminars.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, required software, reader and internet.	

Individual Project - 1913IN225Z

Content of unit of study	The student chooses one or several small projects, which are supportive to the IT-programme and completes it/ them.
Learning outcomes	**Professionalisation**: 6.2.1 **Self-direction** ▪ Is enterprising, shows initiative and dares to take risks. ▪ Takes personal duties and responsibilities seriously. 6.2.2 **Social-communicative skills** ▪ Is able to cooperate effectively within a team. ▪ Is able to communicate effectively with people in various positions/roles. ▪ Is able to listen to and empathise with another person's point of view. ▪ Is able to communicate knowledge, insights and skills to others. ▪ Is able to give and receive feedback. ▪ Expresses him/herself effectively, orally and in writing, using correct, understandable and appropriate language. 6.2.3 **Creativity and problem-solving skills** ▪ Takes substantiated decisions based on the available information and an analysis thereof and comes up with feasible solutions. ▪ Comes up with new ideas, approaches or insights. ▪ Comes up with various solutions to a problem. 6.2.4 **Awareness of social responsibility** ▪ Shows respect and cares for people and things in his/her environment.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Individual Project - 1913IN225A

Assessment objectives/criteria	The student provides the IT- programme a service. For example: ▪ Compile a workshop for grade school students; ▪ Assist lectures during classes or with first year students; ▪ Promoting the programme at our open days; ▪ The student may also design, develop or test assignments that are beneficial to the IT-programme. Specific arrangements can be made with the lectures offering the assignments. More information about possible assignments can be found in the Moodle course Information Technology General	
Details of assessments	Individual evaluation conversation with the involved teacher.	
Strategies and teaching activities	In this study unit, varying skills are practiced for example: teamwork, assistance and presentation skills or public speaking skills.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None.	

Term 2

Project Application Design - 1919IN211Z

Content of unit of study	Content of the dossier consists of different sub-documents from the different courses from term 2.2. Details and assessment can be found on Moodle.
Learning outcomes	
Requirements for participation in units of study (See also Article 29 TER)	
Specific details	

Assessment: Application Design - 1915IN211A

Assessment objectives/criteria	▪ Problem analyses; ▪ Target group analyses / personas; ▪ Requirements analyses; ▪ Create User scenarios / flows per event; ▪ Graphic design (visual design/ user interface design/ user experience design); ▪ Research skills and professional development; ▪ Final graphic design (desktop and mobile); ▪ Final user scenario's / flows per event; ▪ Create a working prototype, via a prototyping tool, including excessive (functional) scenarios; ▪ Execution of a usability test with the prototype.
Details of assessments	Click model (50% individual and 50% group).

	Details on Moodle.	
Strategies and teaching activities	▪ Labs; ▪ Usability test including feedback; ▪ Presentations.	
Compulsory attendance (See also Article 115 TER)	Yes	Failing to cooperate or deliberately failing to cooperate or work together as a team will be met accordingly with sanctions to those involved. First Sanction/ penalty is a warning. Second sanction/ penalty is a yellow card. Third sanction/ penalty is a red card, which means you will be disqualified from the project. The project member will be led before the exam commission to be expelled from the project. This also means the student has a fail and will have to resit/ retake the project/ exam.
Permitted aids	None	

Assessment: Functional Documentation - 1919IN211B

Assessment objectives/criteria	▪ Problem analyses; ▪ Target group analyses / personas; ▪ Requirements analyses; ▪ Scenarios.	
Details of assessments		
Strategies and teaching activities	Labs and classes .	
Compulsory attendance (See also Article 115 TER)	Yes	
Permitted aids		

Assessment: Process dossier - 1918IN211C

Assessment objectives/criteria	The students draw up a cooperation agreement in a group context. The students by turns make the agenda and minutes of the project supervision meetings. In addition, the students reflect on the development of their (project) skills and those of their fellow students by means of evaluation forms (peer and self-evaluation) **Test criteria:** ▪ Active contribution to all project management meetings completeness of the following documents (on Moodle): ▪ Cooperation agreement; ▪ Agenda and minutes; ▪ Peer and self-evaluation forms.	
Details of assessments		
Strategies and teaching activities	Project tutoring	
Compulsory attendance (See also Article 115 TER)	Yes	Failing to cooperate or deliberately failing to cooperate or work together as a team will be met accordingly with sanctions to those involved. First Sanction/ penalty is a warning. Second sanction/ penalty is a yellow card. Third sanction/ penalty is a red card, which means you will be disqualified from the project. The project member will be led before the exam commission to be expelled from the project. This also means the student has a fail and will have to resit/ retake the project/ exam.
Permitted aids		

Functional Modeling - 1913IN214Z

Content of unit of study	Functional Modeling(UML): ▪ During the course Introduction to Modeling you were introduced to a variety of UML diagrams and usecases; ▪ During this module you will pay attention to the application of the modeling language UML and conducting/ carry out usecases; ▪ When participating in ICT projects functional requirements are (often) constructed in usecase models and the data/technical requirements in a Class diagram or ERD; ▪ A project deliverable in which these functional requirements are constructed is called the functional design.
Learning outcomes	**Analyse**: ▪ 1.3 Record the data flows and information provision of a business process. (BP) **Design**: ▪ 1.4 Design a software system with modelling techniques using a standard method. (SW)
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Functional Modeling (UML) - 1913IN214A

Assessment objectives/criteria	Based on the functional requirements you can: ▪ Construct a usecase model for (section of a) system which consists of a usecase diagram and several usecases. ▪ Construct an activity diagram for a (decision) algorithm, man-machine dialogue, business process, workflow and/ or orchestration of usecases. Recognize relevant domain classes with attributes and associations in a domain class diagram, in particular, model elements: ▪ Association class ▪ Inheritance ▪ Encapsulation ▪ Derived attributes ▪ Multiplicity ▪ Enumeration Construct a protocol state diagram with regard to modeling external (visual) Processes of a (sub) system of a domain object. Construct a sequence diagram to model dependencies and ordering of interaction by classes with one another;	
Details of assessments	Written exam	
Strategies and teaching activities	Lectures and seminars	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

User Interface Design - 1911IN212Z

Content of unit of study	Designing the user interface for a specific target audience within a specific context. That is the aim within User Interface Design. The student will acquire de theoretic knowledge to be able to design a validated user interface. The course is strongly linked to the HCI-project, in which the project groups go through a full design process.
Learning outcomes	**Advise**: ▪ Advise on the actual deployment of media and resources, taking into account (communication) objectives, target groups, planning and budgeting. (UI) **Design**: ▪ 2.1 Design a coherent and dynamic ICT and/or digital media product, applying partly self-selected techniques, such as scripts, storyboards, navigation structure and matching usability tests. (UI) ▪ 2.5 Determine the quality of the design, for example by testing or prototyping, taking into account the formulated quality characteristics. (SW) ▪ 2.6 Draw up test designs according to a predetermined test strategy. (SW) **Analyse**: ▪ 2.1 Analyse ICT and/or digital media products, target groups and goals based on an overview of current culture and developments concerning the inventory of customer and user needs. (UI) ▪ 2.2 Analyse interface, usage and communication, including usability and user experience. (UI)
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	Advise module guide C1 English level is preferred.

Assessment: User Interface Design - 1911IN212A

Assessment objectives/criteria	The student will be able to: Conduct a task analyses based on a briefing and desk-research. Define a user type via the system, by defining different user profiles (personas). Prioritize main tasks from secondary tasks for the system to be developed. Information Architecture: TAO of navigation, intuitive navigation. Interaction analyses and plan, apply and implement in the project. Design a mood board om which functional as well as visual elements are compiled in relation to the user (main navigation, images, typography and coloring, the general look and feel) Design a wireframe based on the mood board and specific iterations in relation to the design of the interface. Describe and account for the elements from which the wireframe is compiled. Implement a testable prototype using prototyping software. Conduct a usability test after which the results are used improve the tested design. Conduct a usability analyses, write a heuristics report and implement the improvements. Define and validated design of a user interface.	
Details of assessments	Written test	
Strategies and teaching activities	Theory based lectures, interspersed seminars, implement and test, analyse and assignments.	
Compulsory attendance (See also Article 115	No	Yes

TER)	
Permitted aids	None

Project Management 2 - 1917IN214Z

Content of unit of study	The principles of project management from the first year are applied in a Project. Attention is paid to all phases of a project and Requirements analysis and Change management are discussed in more detail. Also the relationship with Project Management according to Prince II is established and knowledge of Programme Management and Portfolio Management is gained. Finally, the relationship between a project management theory and a system development method such as Waterfall, Iterative and Agile is discussed, and knowledge of steering Agile projects is gained. See further test criteria.
Learning outcomes	**Manage:** ▪ 1.2 Layout and use a management system to support software development within a team setting (SW); ▪ 2.2 Apply principles to manage and monitor a software development process. (SW) **Research Skills**: ▪ 1.4 Use sources when approaching a problem; ▪ 2.5 Collect and process the relevant research data.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Project Management 2 - 1917IN214A

Assessment objectives/criteria	The student is able to: ▪ Recognize and apply project activities, tasks and roles; ▪ Recognize and record functionalities of a system. Find, understand and apply information about the sub-activities and documents; ▪ Name the different forms of software testing; ▪ Describe the principles of the Agile method; ▪ Describe the principles of the Program Management and Portfolio Management: ▪ Describe the general characteristics of system development methods, such as project phasing, project risks, project failure, Waterfall principle, prototyping, iterative, incremental, agile, time-boxing.	
Details of assessments	Open Questions exam.	
Strategies and teaching activities	Lectures and seminars/ workshop	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Web Development 1 - 1917IN215Z

Content of unit of study	During this module, students will be introduced to Web Development using PHP and JavaScript. The following topics are covered related to PHP and the development of the backend of web applications: ▪ The object oriented programming syntax; ▪ Processing HTTP requests (GET and POST); ▪ Generating HTML output; ▪ Implementing the MVC design pattern, including the concepts of routing and templating; ▪ Working with relational databases using PDO; ▪ Understanding HTTP headers and status codes; ▪ Storing data between requests in Cookies and Sessions ▪ Reading and writing to and from the file system. The following topics are covered related to JavaScript and the development of the frontend of web applications: ▪ Working with NPM for frontend dependency management; ▪ Working with build tools (such as WebPack); ▪ Working with a CSS framework (such as Bootstrap); ▪ Manipulating the DOM; ▪ Asynchronous client/server communication; ▪ Working with common HTML5 API's.
Learning outcomes	**Manage**: ▪ 2.2 Apply principles to manage and monitor a software development process. (SW) **Analyse**: ▪ 2.1 Analyse ICT and/or digital media products, target groups and goals based on an overview of current culture and developments concerning the inventory of customer and user needs. (UI) **Implement**: ▪ 2.3 Build and make available a software system consisting of multiple subsystems, and using existing components. (SW)
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Web Development 1 - 1917IN215A

Assessment objectives/criteria	The student is able to implement a web application which uses: ▪ A CSS framework for consistent styling of the application; ▪ Sessions (login, logout, register, forget password); ▪ Techniques to prohibit code injection; ▪ The object oriented programming paradigm in combination with the MVC design pattern; ▪ Handling data from forms and URL's using GET and POST; ▪ Database interaction using PDO; ▪ API endpoints providing and processing data; ▪ Client/server communication using Javascript ; ▪ JavaScript DOM manipulation to update parts of pages. The student implements the application in a publicly approachable URL (the URL will be submitted on the digital learning environment (Moodle) (via an assignment). The student will also submit the code on the digital Learning environment (Moodle) (via an assignment).

Details of assessments	Students develop an individual application. The student assures that the web application is approachable via a public URL. The application source code, the URL and any necessary login information are then submitted by the student in a Moodle assignment.	
Strategies and teaching activities	Lectures and Seminars in which PHP and JavaScript theory will be discussed. Weekly assignments will be handed in throughout the module. Consults are part of the seminars and lectures. Students that are in need of extra attention are able to take part during these consults. Homework is part of the assignments, but will not be marked or graded.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	▪ Any IDE or Code Editor; ▪ A local web server for testing purposes; ▪ An online hosting environment for publication of the end result; ▪ FTP or SSH software for uploading files to the server; ▪ Using other software is allowed, however at students own risk.	

English - 1911IN215Z

Content of unit of study	During the workshops students will actively work on their professional communication skills. The following areas will be covered: ▪ Presentation skills ▪ Written correspondence: Business-related e-mails ▪ Report writing techniques ▪ Grammar and pronunciation ▪ In preparation for the final project presentation, students will practice their presentation skills and receive feedback during the lessons. The project group is responsible for preparing the final presentation. Writing skills will be practiced by focusing on business correspondence and report writing techniques related to the term's project. ▪ For more detailed information see the Study Guide on Moodle.
Learning outcomes	**6.1.2 Social-communicative skills** Expresses him/herself effectively, orally and in writing, using correct, understandable and appropriate language. Is able to communicate effectively with people in various positions/roles. (6.4.1 and 6.4.3)
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: English - 1911IN215A

Assessment objectives/criteria	<u>Presentation skills</u> Preparation of a presentation taking into account the most important requirements regarding presentations: ▪ Content & Structure ▪ Length and visual attractiveness of the presentation ▪ Delivery ▪ Fluency and language use ▪ Interaction and Q&A with peer students and lecturers.

	Report writing: ▪ Capable of applying the report writing techniques covered during the lectures. ▪ Writing a business related e-mail applying the structure and grammar covered during the lectures. ▪ Detailed information regarding the assessment will be published on Moodle.	
Details of assessments	Presentation (individual, 50%) Management summary (group, 20%) Correspondence (business related e-mail) (individual, 30%) Assessment criteria: The minimal mark for a pass is 5,5 whereby the mark for each item must be a minimum of 4,5.	
Strategies and teaching activities	7 weeks, 1,5 hour lectures per week; presentation skills, verbal and written assignments which are interactive by nature. Lectures and seminars Literature: see Study Guide on Moodle.	
Compulsory attendance (See also Article 115 TER)	No	Attendance 80%
Permitted aids	None	

Term 3

Project Web Application - 1918IN221Z

Content of unit of study	Based on the results of last terms design report, the web application is implemented and tested, containing a layered object-oriented architecture in PHP and an MySQL server database. Students will be working in the same project group as in the previous term. Every two weeks project consultation sessions will be planned per project group.
Learning outcomes	**Design:** ▪ 2.4 Set up a functional design for a software system, taking into account the existing components and libraries, and using quality criteria of design. (SW) **Implement**: ▪ 2.3 Build and make available a software system consisting of multiple subsystems, and using existing components. (SW) **Professionalisation:** **6.1.1 Self-direction** ▪ Is able to operate in critical situations in an independent, results-oriented and stress-free manner. **6.1.2 Social-communicative skills** ▪ Is able to communicate effectively with people in various positions/roles. **6.1.3 Creativity and problem-solving skills** ▪ Comes up with new ideas, approaches or insights. ▪ Comes up with various solutions to a problem. **6.2.1 Self-direction** ▪ Is able to operate in critical situations in an independent, results-oriented and stress-free manner. ▪ Is enterprising, shows initiative and dares to take risks. ▪ Recognises personal focus points and formulates learning goals based on feedback and self-reflection. ▪ Is good at planning and organising, monitoring milestones and deadlines, and honours commitments.

	■ Is able to identify, integrate and apply relevant knowledge and insights in every new situation. ■ Takes personal duties and responsibilities seriously. **6.2.2 Social-communicative skills** ■ Is able to cooperate effectively within a team. ■ Is able to communicate effectively with people in various positions/roles. ■ Is able to listen to and empathise with another person's point of view. ■ Is able to communicate knowledge, insights and skills to others. ■ Is able to give and receive feedback. ■ Expresses him/herself effectively, orally and in writing, using correct, understandable and appropriate language. ■ Is able to account for the achieved results and the process. **6.2.3 Creativity and problem-solving skills** ■ Takes substantiated decisions based on the available information and an analysis thereof and comes up with feasible solutions. ■ Comes up with new ideas, approaches or insights. ■ Comes up with various solutions to a problem. **Research Skills** ■ Map out the relevant aspects of a simple problem. ■ Formulate possible solutions to identified problems. ■ Handle a problem in a systematic way ■ Use sources when approaching a problem ■ Process the provided and collected information. ■ Defend choices made regarding the final result. ■ Critically reflect on the handling of the problem. ■ 2.1 Map out the relevant aspects of the problem ■ 2.2 Clearly formulate the goal and research questions based on the given case. ■ 2.3 Identify an approach to systematically answer the research questions. ■ 2.4 Select and use relevant sources to answer the research questions ■ 2.5 Collect and process the relevant research data ■ 2.6 Derive conclusions and/ or recommendations from research results ■ 2.7 Critically reflect on the research approach
Requirements for participation in units of study (See also Article 29 TER)	Yes. Failing to cooperate or deliberately failing to cooperate or work together as a team will be met with sanctions/ a penalty. First Sanction/ penalty is a warning. Second sanction/ penalty is a yellow card. Third sanction/ penalty is a red card, which means you will be disqualified. The project member will be led before the exam commission to be expelled from the project. This also means the student has a fail and will have to resit/ retake the project/ exam.
Specific details	None

Assessment: Application - 1917IN221A

Assessment objectives/criteria	The student: ■ Is capable of providing clear answers, which allows the student to prove a constructive and relevant contribution to the project and takes responsibility for this contribution; ■ Is able to prove the contributions are in fact made by the student by explaining choices and being able to answer questions about the code written by the student concerning code and functionality; ■ Is able to explain elaborately on choices that were made regarding certain programming solutions/ answers; ■ Is able to explain and argue how a chosen design pattern is applied to the written code; ■ Shows understanding of quality aspects on written code. Is able to recall programming solutions which were discussed in the project group, moreover, the student is able to recall what arguments and/ or problems that occurred during the project. In addition to the individual themes / functionalities determined with the client, the application contains at least the following functionalities: ■ Show the different themes / events, retrieved from the database; ■ Selecting one and / or multiple tickets for one and / or multiple events in the shopping cart; ■ Ordering one and / or multiple tickets for one and / or multiple events and receiving an order confirmation; ■ Possibility to pay with iDEAL, Paypal, Credit card via a link with a PSP API (Payment Service Provider - Application Programming Interface).

	▪ Possibility to receive invoice in PDF; ▪ Possibility to receive tickets in PDF; ▪ Link with Social Media (feed); ▪ Log in, register, log out, forgot password; ▪ Ability to edit, delete and add pages / events / users / orders / images / texts with a CMS (Content Management System).	
Details of assessments	Individual assessment During an assessment, the project group, as well as very individual group member presents part of the project's result.	
Strategies and teaching activities	Consultation and workshops	
Compulsory attendance (See also Article 115 TER)	Yes	Insufficient contribution to or obstruction of group work may be penalized. In the first instance students receive a warning; a second breach leads to a yellow card and a third breach to ejection from the project group (red card). For further details of the disciplinary policy, please refer to the project manual and the relevant Moodle Course.
Permitted aids	PC, Specific software	

Assessment: Technical documentation - 1918IN221B

Assessment objectives/criteria	The student can: ▪ Provide use case descriptions and use case diagrams (UML) to clarify interaction between users and system; ▪ Provide activity diagrams for every use case to clarify the flow within a use case, demonstrating the dialog between user(s) and system; ▪ Using a class diagram (UML) to clarify the hierarchy and structure of the code; ▪ Using a sequence diagram (UML) to show the operation and sequence of methods and exchange between different classes; ▪ Using a state diagram (UML) to make the life cycle of the different classes visible; ▪ Show the database structure with the help of an ERD / EER; ▪ Using end-user documentation (user manual) make clear how the product can be used.	
Details of assessments	Written task; hand in Moodle.	
Strategies and teaching activities	Working independently in groups The student receives a bi-weekly project consultation.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanction policy, reference is made to the project manual and the relevant Moodle.
Permitted aids		

Assessment: Process dossier - 1918IN221C

Assessment objectives/criteria	The students draw up a cooperation agreement in a group context. The students in turn make the agenda and minutes of the project supervision meetings. In addition, the students reflect on the development of their (project) skills and those of their fellow students by means of. evaluation forms (peer and self-evaluation). **Test criteria:** ▪ Active contribution to all project management meetings completeness of the following documents (on Moodle): ▪ Cooperation; ▪ Agenda and minutes; ▪ Peer and self-evaluation forms.
Details of	

assessments Strategies and teaching activities	Project support.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation in all project activities apply to all projects (see also Article 27a). The rules can vary per project and are published on Moodle. Insufficient active contribution and participation in the project can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual.
Permitted aids	None	

Entrepeneurship & ICT - 1921OSICTZ

Content of unit of study	The module Entrepreneurship & IT develops your knowledge, insight and skills in the field of entrepreneurship in combination with IT skills. In this module, you will work in pairs to draw up a business plan for an IT company that you would like to set up in the future. The following aspects must be included in this business plan: ▪ Personal motives, qualities and ambitions ▪ A worked out idea of the company (including legal form) ▪ A picture of the market, target groups, competition and a SWOT analysis ▪ A marketing plan based on the 5 Ps ▪ A financial plan with a revenue model, investment budget (one-off), financing budget (3 years) and operating budget (3 years)
Learning outcomes	**Analysing**: ▪ 2.1 Analysing ICT and/or digital media products, target groups and objectives from an overview of current 'culture' and trends in order to identify customer or user needs (GI). **Advising**: ▪ 2.3 Advising on new opportunities for the organisation based on developments in ICT (BP). **Investigative power**: ▪ 2.1 Identifying the relevant aspects of the problem; ▪ 2.4 Select and use relevant sources to answer the research questions; ▪ 2.5 Collect and process the relevant research data; ▪ 2.6 Draw conclusions and/or recommendations from research results. ▪ 2.7 Reflect critically on the research approach. **2.1 Self-directed ability** ▪ Can operate independently, result-oriented and stress-resistant in critical situations. ▪ Is enterprising, shows initiative and dares to take risks. ▪ Recognises own points of attention and formulates learning goals based on feedback and self-reflection. ▪ Good at planning and organising, monitors milestones and deadlines, and keeps appointments. ▪ Can detect, integrate and apply relevant knowledge and insights in constantly changing situations. ▪ Takes its own task and role seriously. **2.3 Creativity and problem-solving capabilities**

	■ Takes reasoned decisions based on available information and analysis thereof and comes up with workable solutions. ■ Comes up with new ideas, approaches or insights. ■ Comes up with different solutions to a problem.
Requirements for participation in units of study (See also Article 29 TER)	No
Specific details	No

Assessment: Business Plan - 1921OSICTA

Assessment objectives/criteria	The student draws up a business plan containing the following aspects: ■ Personal motives, qualities and ambitions ■ A worked out idea of the company (including legal form) ■ A picture of the market, target groups, competition and a SWOT analysis ■ A marketing plan based on the 5 Ps ■ A financial plan with a revenue model, investment budget (one-off), financing budget (3 years) and operating budget (3 years)	
Details of assessments	Assessment takes place by means of a business plan.	
Strategies and teaching activities	Various lectures/work sessions are scheduled. During the lectures, you will be given the necessary theoretical foundation to work on the business plan in project groups under supervision. A number of consultation moments are scheduled.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	n.a.	

Assessment: Business Pitch - 1921OSICTB

Assessment objectives/criteria	The student (in pairs) presents the relevant parts of the business plan in a convincing manner to a lender and demonstrates a viable plan.	
Details of assessments	Assessment takes place by means of a presentation.	
Strategies and teaching activities	The lectures 'Entrepreneurship and IT' are supportive and preparatory to the pitch.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	n.a.	

Web Development 2 - 1920IN223Z

Content of unit of study	This module builds on the previous module (Web Development 1). The following topics are covered related to PHP and the development of the backend of web applications: ■ Working with Composer for backend dependency management; ■ Integrating an existing external API (such as a payment provider); ■ Creating REST API endpoints; ■ Recognizing and mitigating common security concerns (such as injection vulnerabilities and cross-site request forgery);

	▪ Running web applications inside Docker containers; ▪ Creating a CI/CD pipeline from a source repository to a hosting environment. The following topics are covered related to JavaScript and the development of the frontend of web applications: ▪ Implementing an SPA (Single Page Application) in a JavaScript framework (such as Vue.js); ▪ Structuring an application into logical parts; ▪ Using routing for navigation; ▪ Implementing data binding; ▪ Implementing state management; ▪ Communicating with a REST API; ▪ Implementing security using JWT.
Learning outcomes	**Manage**: ▪ 2.2 Apply principles to manage and monitor a software development process. (SW) **Analyse**: ▪ 2.1 Analyse ICT and/or digital media products, target groups and goals based on an overview of current culture and developments concerning the inventory of customer and user needs. (UI) **Implement**: ▪ 2.3 Build and make available a software system consisting of multiple subsystems, and using existing components. (SW)
Requirements for participation in units of study (See also Article 29 TER)	Students have prior knowledge and skills on the level of Web Development 1.
Specific details	

Assessment: Web Development 2 - 1917IN223A

Assessment objectives/criteria	The student is able to implement a web application comprising of the following parts: A frontend implemented using a JavaScript framework such as Vue.js for the main part of the application, that uses: ▪ Routing; ▪ Data binding; ▪ State management; ▪ Authentication using JWT. A backend using an MVC implementation that provides data to the main frontend using an API. It also uses ▪ Routing and templating functionality to provide a UI for part of the application that is not implemented using the JavaScript framework; ▪ Common practices to mitigate security risks; ▪ An existing API to enable payment options. The complete application should be published to an online hosting environment from a source repository, using a CI/CD pipeline.	
Details of assessments	Students develop an individual application. The student assures that the web application is approachable via a public URL. The application source code including the CI/CD pipeline, the public URL and any necessary login information are then submitted by the student in a Moodle assignment.	
Strategies and teaching activities	Lectures and Seminars in which PHP and JavaScript theory will be discussed. Weekly assignments will be handed in throughout the module. Consults are part of the seminars and lectures. Students that are in need of extra attention are able to take part during these consults. Homework is part of the assignments.	
Compulsory attendance (See also Article 115	No	

TER)	
Permitted aids	▪ Any IDE or Code Editor; ▪ A local web server for testing purposes; ▪ An online hosting environment for publication of the end result; ▪ FTP or SSH software for uploading files to the server; ▪ Docke;r ▪ Using other software is allowed, however at students own risk.

Linux 2 - 1920IN226Z

Content of unit of study	This course is the continuation of the Linux 1 course from the first year. In this training we will go more deeply into managing Linux systems, security, scripting and networks.
Learning outcomes	**Manage**: ▪ 1.2 - Setting up and using a management system to support software development in a team context (SW). **Analyze**: ▪ 1.8 - Describe the architecture of a computer system (HW).
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	Continued on Linux 1.

Assessment: Linux 2 - 1918IN226A

Assessment objectives/criteria	The student has knowledge of the following subjects:
	▪ The topics from Linux 1 (recap);
	▪ System Security and Encryption:
	  ▪ SSH
	  ▪ SCP
	  ▪ SSL
	▪ Mysql and Apache;
	▪ User and Group Accounts;
	▪ Permissions;
	▪ System Time / NTP;
	▪ System Logs;
	▪ UFW – Uncomplicated FireWall;
	▪ Performance tuning;
	▪ Scripting;
	▪ Scheduling jobs;
	▪ Networking (NIC, DNS, SMB, NFS).	

Details of assessments	Multiple-choice exam.	
Strategies and teaching activities	Lecture, explanation of commands and configuration.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Pen and scratch paper.	

Assessment: Linux 2 Practical - 1920IN226B

Assessment objectives/criteria	

Details of assessments		
Strategies and teaching activities		
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Professional Skills Year 2a - 1919IN227Z

Content of unit of study	Professional skills helps students gain an understanding of: ▪ Themselves, their motives for participating in the programme, interests, expectations, style of working and learning, way of planning and structuring their studies and way of collaboration; ▪ The programme and future professional career, the competencies the programme provides training in, the different options within the programme and the possible majors; ▪ Their educational and professional career and to reflect on the experiences and the choices that can be made in this respect; ▪ The way of planning and structuring their studies and writing a personal development plan (PDP) reflecting their own development and new insights concerning items 1 to 3. Throughout the professional skills lectures of the 2nd year, students prepare themselves for the internship during the first half year of the 3rd year as well as the specialization in the 3rd year and the profession. Students do research on the ICT profession and write a report, as well as present the outcomes. Students is present at the presentations from the third year interns.
Learning outcomes	**6.2.1.Self-direction** ▪ Is able to operate in critical situations in an independent, results-oriented and stress-free manner. ▪ Is enterprising, shows initiative and dares to take risks. ▪ Recognizes personal focus points and formulates learning goals based on feedback and self-reflection. ▪ Is good at planning and organising, monitoring milestones and deadlines, and honours commitments. ▪ Is able to identify, integrate and apply relevant knowledge and insights in every new situation. ▪ Takes personal duties and responsibilities seriously. **6.2.2 Social-communicative skills** ▪ Is able to cooperate effectively within a team. ▪ Is able to communicate effectively with people in various positions/roles. ▪ Is able to listen to and empathise with another person's point of view. ▪ Is able to communicate knowledge, insights and skills to others. ▪ Is able to give and receive feedback. ▪ Expresses him/herself effectively, orally and in writing, using correct, understandable and appropriate language. ▪ Is able to account for the achieved results and the process. **6.2.4 Awareness of social responsibility** ▪ Is aware of the importance of ethics and social values for an organisation and supports these. ▪ Can handle diversity (people from various cultures and backgrounds). ▪ Shows respect and cares for people and things in his/her environment. **Research Skills** ▪ 7.2.3 Identify an approach to systematically answer the research questions. ▪ 7.2.4 Select and use relevant sources to answer the research questions. ▪ 7.2.5 Collect and process the relevant research data. ▪ 7.2.6 Derive conclusions and/or recommendations from research results.
Requirements for	None.

participation in units of study (See also Article 29 TER)	
Specific details	None.

Assessment: Professional Skills Year 2a - 1919IN227A

Assessment objectives/criteria	The student are able to: ▪ Describe their own learning needs and translate these into SMART objectives in a personal development plan (PDP); ▪ Systematically work on their own academic and professional development concerning knowledge, skills and attitudes related to the competencies of the ICT Bachelor; ▪ Write a report reflecting on their own (personal and study) experiences, their own way of working during their studies, their achieved results and their own performance as a team member based on feedback; ▪ Take action in order to enhance their knowledge and skills in the areas of the programme and their future profession; ▪ Discuss work experiences and their own performance with fellow students and learn from that students reflect on feedback, reflection, their strengths and weaknesses; ▪ Students write a resume and a letter for application for an internship, based on requirements of the professional IT-area.	
Details of assessments	Discussion and written exam (assignments and discussions)	
Strategies and teaching activities	Three lectures throughout every term, assignments and individual coaching. In the first or second term, students attend presentations form third year students and write a report. This report is part of the student's professionalisation. In term 1 or 2 students attent a presentation from a third year intern and write a report about this for their labour market research. **Material:** ▪ Syllabus Professional Skills year 2. ▪ Roel Grit e.a.: Managing your competences.	
Compulsory attendance (See also Article 115 TER)	Yes	The professional skills classes are interactive by nature. During the lectures personal experiences and assignments are discussed and shared, including providing mutual feedback and shared reflection. Because the classes revolve around the group process, all students are required to attend at least 80% of the lectures. If a student has not met the compulsory attendance requirement, students will have to resit the course next year. Individual coaching meeting: Students must attend the individual coaching. If a student does not attend, a No Show assessment will be issued (1st attempt). The discussion may be repeated in the resit period (2d attempt).
Permitted aids	None.	

Term 4

Project Code Generation - 1921IN241Z

Content of unit of study	Students design and develop a REST API for a specific purpose in a project group using a selected Java framework. Using Javascript, students give this application a rudimentary user interface, focused on the roles of stakeholders.
Learning outcomes	**Realize:** ■ 2.3 - Building and making available a software system that consists of several subsystems, making use of existing components (SW). ■ Use test automation when performing tests (SW) **To design:** ■ Drawing up a design for a software system, taking into account the use of existing components and libraries; use design quality criteria. (SW) ■ Prepare test designs according to a given test strategy (SW).
Requirements for participation in units of study (See also Article 29 TER)	Project of Year 1, term 4 must have been completed.
Specific details	

Assessment: Code Review - 1918IN241A

Assessment objectives/criteria	- The application meets the functional requirements. - User roles are adequately implemented and provided with the necessary security guarantees. - The code is of a decent quality and consistency. - The code follows the standards that fit within the framework used.	
Details of assessments	Students submit a Git link to the examiners.	
Strategies and teaching activities	Project consultations, in which questions can be asked to the teachers.	
Compulsory attendance (See also Article 115 TER)	Yes	
Permitted aids		

Assessment: API design - 1918IN241B

Assessment objectives/criteria	- The application meets the functional requirements. - The application meets a RESTful design. - The Swagger specification provides adequate documentation.	
Details of assessments	Students submit a Git link to the examiners.	
Strategies and teaching activities	Workshops in which theory and practice are alternated.	
Compulsory attendance (See also Article 115 TER)	Yes	
Permitted aids		

Assessment: API testing - 1918IN241C

Assessment objectives/criteria	- The application meets the functional requirements. - The application is provided with a sufficient degree of unit testing. - The application is provided with a sufficient degree of functional tests.	
Details of assessments	Students submit a Git link to the examiners.	
Strategies and teaching activities	Workshops in which theory and practice are alternated.	
Compulsory attendance (See	Yes	

also Article 115 TER)		
Permitted aids		

Assessment: Code assessment - 1918IN241D

Assessment objectives/criteria	- The relative share of the student's work. - The collaboration with other code. - The justification and explanation of design choices. - The quality of the chosen solution directions.	
Details of assessments	Students present their code individually in the presence of examiners.	
Strategies and teaching activities	Project Consult	
Compulsory attendance (See also Article 115 TER)	Yes	
Permitted aids		

Assessment: Process dossier - 1919IN241E

Assessment objectives/criteria	The students draw up a cooperation agreement in a group context. The students by turns make the agenda and minutes of the project supervision meetings. In addition, the students reflect on the development of their (project) skills and those of their fellow students by means of the retro evaluation form. **Test criteria**, ■ Active contribution to all project management meetings completeness of the following documents (on Moodle): ■ Collaboration agreement ■ Agenda and minutes ■ Retro evaluation form	
Details of assessments		
Strategies and teaching activities		
Compulsory attendance (See also Article 115 TER)	Yes	
Permitted aids		

Java Advanced - 1921IN248Z

Content of unit of study	This study unit covers the development and implementation of a Multithreaded Client-Server application in Java. Subjects discussed during the lectures: ■ Threads ■ Synchronisation ■ Connections ■ State Machines ■ Asynchrone Communication ■ Timing and Concurrency ■ Software design Principles
Learning outcomes	**Implement**:

	▪ 2.3 Build and make available a software system consisting of multiple subsystems, and using existing components. (SW)
Requirements for participation in units of study (See also Article 29 TER)	None. This module is an extension to Java Fundamentals and strengthens students' knowledge on Java programming.
Specific details	None

Assessment: Java Advanced - 1915IN248A

Assessment objectives/criteria	The students is able to develop a Client-Server Application in Java. The application meets the following requirements: During the development stage of the application the following Software Design Principles are applied: ▪ Open/ closed Principle; ▪ Dependency Inversion Principle; ▪ Interface Segregation Principle; ▪ Single Responsibility Principle; ▪ Liskov's Substitution Principle; ▪ The client and the server are constructed according to the Model-View-Controller pattern; ▪ The Client-Server communication is implemented using Threads; ▪ The server will be tested using several automated clients.	
Details of assessments	The module is assessed with an individual practical exam. In preparation to this exam the student prepares and completes an assignment. During the exam the student will be asked to implement several extensions to the prepared assignment.	
Strategies and teaching activities	Theory and practice are part of the lectures.During the lectures, theory will be discussed in combination with practice seminars. The lecturer will be present during practice to consult and advice students. The assignments are part of the homework as well.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Computer, laptop, internet and specific software	

Social Ethical/Legal Research - 1917IN243Z

Content of unit of study	In this subject unit, different aspects and skills in relation to social-ethical and legislation are brought together. During these classes, IT related topics are analyzed from an ethical and from a legal point of vue. Students apply various steps of the ethical and of the legal cycle in order to solve a problem or dilemma in a structured way. Some of the classes will focus specifically on the legal and social-ethical themed features and aspects and some classes will focus on improving of- and conducting research skills. The student has to pick a topic that is related to ICT and which has social relevancy and is current in its nature. Students are to conduct research on this chosen topic, and are to answer how and what kind of social ethical and legal aspects are applicable to the chosen topic. Based on the research, students are expected to deliver a research paper. In order to deliver this research paper, the students are provided with classes in effective writing to improve their skills. In this research it will be crucial to provide persuasive and convincing evidence and reasoning to support the answers in relation to the ethical and legal aspects of the chosen topic and therefore, some classes will focus on reasoning and building of persuasive answers that are supported by the evidence found in the research. The student will learn about ethical dilemma's that occur in the professional environment related to ICT

	profession(s) and the student will learn to analyze these dilemma's in accordance with the ethical cycles, Royakkers en Pieters 2006. With the support of this instrument, the student is to provide a balanced conclusion that leads to professional and ethical conduct. Furthermore, the student will receive an introduction into legal aspects that provide relevant disciplines and information as well as to provide for which laws are applicable to ICT. Moreover, the student will receive information on which search engines, research portals and tools are available to conduct research on primary legal materials, reports, judgments and legislation, legal news, text books and journals. The student will (on individual basis) collect information from different sources, select and put the information in order (also known as desk research). The student will be taught how to apply methodology and principles in order to achieve the desk research successfully. During this process of research and writing of the research paper, the student will receive support and feedback from the teacher/professor as well as supporting feedback of peer students. Peer feedback plays an important role.
Learning outcomes	**Professionalisation skills**: **6.2.1 self-direction**: ▪ Is able to identify, integrate and apply relevant knowledge and insights in every new situation. **6.2.2 Social-communicative skills**; ▪ Is able to cooperate effectively within a team. ▪ Is able to communicate effectively with people in various positions/roles. ▪ Is able to listen to and empathize with another person's point of view. ▪ Is able to communicate knowledge, insights and skills to others. ▪ Is able to give and receive feedback. **6.2.3 creativity and problem-solving skills**; ▪ Takes substantiated decisions based on the available information and an analysis thereof and comes up with feasible solutions. ▪ Comes up with new ideas, approaches or insights. ▪ Comes up with various solutions to a problem. **6.2.4 consideration of social responsibility**: ▪ Is aware of the importance of ethics and social values for an organisation and supports these. ▪ Can handle diversity (people from various cultures and backgrounds). **Research Skills:** ▪ 7.2.1. Map out the relevant aspects of the problem. ▪ 7.2.2 Clearly formulate the goal and research questions based on a given case. ▪ 7.2.3 Identify an approach to systematically answer the research questions. ▪ 7.2.4 Select and use relevant sources to answer the research questions. ▪ 7.2.5 Collect and process the relevant research data. ▪ 7.2.6 Derive conclusions and/or recommendations from research results. ▪ 7.2.7 Critically reflect on the research approach.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Desk Research - 1917IN243A

Assessment objectives/criteria	In the research paper, the student will be assessed on: ▪ quality of research set-up ▪ quality of conduct of research (data construction and data analysis) ▪ quality of report (including written quality of text) ▪ knowledge of and insight into legal issues ▪ knowledge and insight into fundamental principles and methodology of ethics (ethical cycle) en the ability to apply this in a professional environment and to analyse in ICT
Details of assessments	Research paper of at approximately 4000 words on a ITC related topic that is relevant and current in which the subject skills are used by the student to obtain a conclusion and practical and workable solution.

Strategies and teaching activities	Classes in which theory and assignments will be discussed.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Assessment: Peer Feedback - 1917IN243B

Assessment objectives/criteria	The student is able to provide feedback on the deliverables of other students based on the criteral used for the research paper. Furthermore, the student is capable to accept feedback of other students and to use this feedback to improve his/her own research paper. Provision of and receipt of feedback will be ensured because of the mandatory participation to present the reseach paper as part of the subject deliverables.	
Details of assessments		
Strategies and teaching activities	Mandatory participation in regards to conducting of research and writing of the research paper.	
Compulsory attendance (See also Article 115 TER)	Yes	Participation in online peer review sessions is compulsory. Also mandatory attendence during classes that are used for students to obtain or provide feedback. If the student is not capable to attend, the student is expected to provide written feedback based on the instructions received from the teacher/professor.
Permitted aids	None	

Assessment: Debating - 1917IN243C

Assessment objectives/criteria	The student is capable to participate as a member of a team and provide relevant and effective support to the team for the preparation and conducting of the debate. Mandatory participation due to presentation deliverable.	
Details of assessments	Participate in the debate The result will be determined within 20 working days (Also see art. 131 TER)	
Strategies and teaching activities	Students are to create teams and have debate sessions based on topics provided by the teacher/professor.	
Compulsory attendance (See also Article 115 TER)	No	Mandatory attendence during classes that are used for students to create teams and prepare for and attend the debates. If the student is not capable to attend, the student is expected to write an essay based on the instructions received from the teacher/professor.
Permitted aids	None	

Professional Skills Year 2b - 1919IN247Z

Content of unit of study	Professional skills helps students gain an understanding of: ▪ Themselves, their motives for participating in the programme, interests, expectations, style of working and learning, way of planning and structuring their studies and way of collaboration; ▪ The programme and future professional career, the competencies the programme provides training in, the different options within the programme and the possible majors; ▪ Their educational and professional career and to reflect on the experiences and the choices that can be made in this respect; ▪ The way of planning and structuring their studies and writing a personal development plan (PDP) reflecting their own development and new insights concerning items 1 to 3.

	Throughout the professional skills lectures of the 2nd year, students prepare themselves for the internship during the first half year of the 3rd year as well as the specialization in the 3rd year and the profession. Students learn how to write a good cv and cover letter. In term 4, students attend lectures on job interviewing and presenting yourself via Social Media by guest lecturers.
Learning outcomes	**6.2.1.Self-direction** ▪ Is able to operate in critical situations in an independent, results-oriented and stress-free manner. ▪ Is enterprising, shows initiative and dares to take risks. ▪ Recognizes personal focus points and formulates learning goals based on feedback and self-reflection. ▪ Is good at planning and organising, monitoring milestones and deadlines, and honours commitments. ▪ Is able to identify, integrate and apply relevant knowledge and insights in every new situation. ▪ Takes personal duties and responsibilities seriously. **6.2.2 Social-communicative skills** ▪ Is able to cooperate effectively within a team. ▪ Is able to communicate effectively with people in various positions/roles. ▪ Is able to listen to and empathise with another person's point of view. ▪ Is able to communicate knowledge, insights and skills to others. ▪ Is able to give and receive feedback. ▪ Expresses him/herself effectively, orally and in writing, using correct, understandable and appropriate language. ▪ Is able to account for the achieved results and the process. **6.2.4 Awareness of social responsibility** ▪ Is aware of the importance of ethics and social values for an organisation and supports these. ▪ Can handle diversity (people from various cultures and backgrounds). ▪ Shows respect and cares for people and things in his/her environment. **Research Skills** ▪ 7.2.3 Identify an approach to systematically answer the research questions. ▪ 7.2.4 Select and use relevant sources to answer the research questions. ▪ 7.2.5 Collect and process the relevant research data. ▪ 7.2.6 Derive conclusions and/or recommendations from research results.
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Professional Skills Year 2b - 1919IN247A

Assessment objectives/criteria	The student are able to: ▪ Describe their own learning needs and translate these into SMART objectives in a personal development plan (PDP); ▪ Systematically work on their own academic and professional development concerning knowledge, skills and attitudes related to the competencies of the ICT Bachelor; ▪ Write a report reflecting on their own (personal and study) experiences, their own way of working during their studies, their achieved results and their own performance as a team member based on feedback; ▪ Take action in order to enhance their knowledge and skills in the areas of the programme and their future profession; ▪ Discuss work experiences and their own performance with fellow students and learn from that students reflect on feedback, reflection, their strengths and weaknesses; ▪ Students write a resume and a letter for application for an internship, based on requirements of the professional IT-area.
Details of assessments	Discussion and written exam (assignments and discussions)
Strategies and teaching activities	Three lectures throughout every term, assignments and individual coaching. In the first or second term, students attend presentations form third year students and write a report. This report is part of the student's professionalisation. A job interviewing training is provided in term 3.

	A seminar on LinkedIn is part of the lectures in term 4. Guest lecturers will provide the job interview training as well as the LinkedIn seminar. **Material:** ▪ Syllabus Professional Skills year 2. ▪ Roel Grit e.a.: Managing your competences.	
Compulsory attendance (See also Article 115 TER)	Yes	The professional skills classes are interactive by nature. During the lectures personal experiences and assignments are discussed and shared, including providing mutual feedback and shared reflection. Because the classes revolve around the group process, all students are required to attend at least 80% of the lectures. If a student has not met the compulsory attendance requirement, students will have to resit the course next year. Individual coaching meeting: students must attend the individual meeting. If a student does not attend, a No Show assessment will be issued (1st attempt). The discussion may be repeated in the resit period (2d attempt).
Permitted aids	None	

Year 3

Basic curriculum

Semester 1

Internship - 1920PRSTGZ

Content of unit of study	The internship in Year 3 lasts 20 weeks. Working in the role of an employee, students will gain experience with the performance of assignments in a company or organisation. They will do this under supervision, but with an increasing level of independence. Students will gain relevant expertise, practise professional skills and complete professional assignments in a specific field. A great deal of emphasis will be placed on the further development and refinement of the students' professional attitude and competences. By reflecting on their work experiences, students will learn to continually work on the improvement of their actions. They will also gain a better insight into what is required of them in professional practice, the extent to which the profession is right for them and the direction in which they want to develop further. **Starting points** The degree programme applies the following starting points in relation to the internship: ▪ Familiarisation with professional practice; ▪ Applying, expanding and deepening specialist knowledge; ▪ Applying, expanding and deepening insight into structures and organisations and experiencing business cultures; ▪ Achieving the competences envisaged, as specified by the student; ▪ Gaining practical skills: the ability to organise, coordinate and integrate fields, for example; ▪ Gaining communication skills: the ability to hold work meetings and report and present, for example; ▪ Gaining social skills: the ability to adapt, independently form an opinion, show initiative and develop a sense of responsibility, for example. The following components will be considered when assessing the internship:

	■ Internship start document: satisfactory; ■ Internship report 80%; ■ End presentation internship 20%. Each component must be completed with a passing mark at the very least. If a component has not been completed with a passing mark, a retake period of at least five working days after the assessment will apply.
Learning outcomes	By completing an internship assignment or assignments, students will develop competences (skills). These are the skills that students will need to deliver the professional performance envisaged, subject to the integration of knowledge, skills and attitude. The internship will enable students to demonstrate their ability to apply a number of competences at Level 2 (professional competence) as part of an integrated approach. Students will demonstrate at least one of the following professional competences: ■ 'design' or 'realization'; students will be free to decide which of the two they want to demonstrate. To do this, students will need to make a demonstrable contribution to the creation of a product or design during their internship; ■ Students will also demonstrate at least one of the other professional competences: 'analysis', 'design', 'realization', 'manage', 'advice'; ■ finally, students will demonstrate a mastery of the 'professionalization' competence at Level 2; ■ Students must demonstrate the achievement of at least one achievement indicator at Level 2 for the competences chosen.
Requirements for participation in units of study (See also Article 29 TER)	In Week 4 of the term prior to the term in which students are due to start their internships, steps will be taken to establish whether or not they have met the conditions for participation in the internship. To be able to start the internship, the following entry requirements must have been met by this reference date: ■ A minimum of 90 credits has been attained; ■ The projects (group work) that fall in the same term as the internship have been completed successfully; ■ Student has passed module Interviewing and Report Writing (term 1.3, 1918IN131B). Students will be able to start their internship in any term, provided they meet all of the entry requirements by Week 4 of the previous term. The reference period for anyone wanting to start an internship in Term 1 is Week 4 of Term 4. *Exception for Term 5* Students who have obtained a minimum of 100 credits by the end of the academic year (term 4) may lodge a request with the internship committee prior to week 1 of term 5 in which they explain why they want to start their internship in term 1. The internship committee will make a decision in Week 1 of Term 5. No supervision will be provided in Term 5. This means that the internship will take place in Term 4 and Term 1 of the next academic year if a student starts his internship in Term 4.
Specific details	The professional internship will last a total of 20 weeks (100 working days) and will represent a total of 29 credits.

Assessment: Internship start document - 1920PRSTGA

Assessment objectives/criteria	A clear description is provided of the company. This should include a description of: ■ The mission and vision; ■ Products, services and clients; ■ The organisational structure and processes; ■ Methods and techniques used in the company; ■ Interviews with two job holders. The learning objectives have been formulated clearly and the reasons for choosing these specific learning objectives and competences (achievement indicators) has been explained; A specific description has been provided of how the student will work on the learning objectives during the internship via the internship assignment(s) and activities; A clear schedule is provided, setting out the various activities, interdependencies, the time necessary and the time frame for the part of the internship assignment that is already known when the internship starts;

	The document is in compliance with reporting requirements.	
Details of assessments	During the first few weeks of a student's internship, they will get to know the company, formulate their learning objectives and plan how to achieve them by completing assignments and internship duties. See the 'Internship start document' assignment on the Moodle course for more information about this assignment.	
Strategies and teaching activities	Internship, preparation of the 'Internship start document'	
Compulsory attendance (See also Article 115 TER)	Yes	The internship will last 100 days, during which students will be present at the internship company or at school for the activities scheduled there. As the internship period lasts more than 20 weeks, there will be some slack for students to make up any time lost due to illness. If the days lost due to a student's illness cannot be made up due to the length of his or her illness, the internship student will be required to contact his supervising lecturer and the internship coordinator. It may then be decided to extend the internship, making it possible for the student to compensate the days lost.
Permitted aids	N/A	

Assessment: Internship Report - 1920PRSTGB

Assessment objectives/criteria	Company description ▪ Description of duties and results; ▪ STARR-based competence report; ▪ Reflection based on the learning objectives from the internship start document and the professional attitude score list; ▪ Reporting techniques; ▪ In the appendix: time sheet and professional attitude score list (1 and 2).	
Details of assessments	See the 'final internship report' assignment on the Moodle course for a detailed description of the content of and requirements to be met by the final report.	
Strategies and teaching activities	The student will be expected to have the ability to work on ICT projects and assignments, which he will do independently in part and partly under expert supervision. This will ensure that projects and assignments are completed as they should be. The student will be expected to produce a final internship report, including a competence report, reflection and time sheet.	
Compulsory attendance (See also Article 115 TER)	Yes	The internship will last 100 days, during which students will be present at the internship company or at school for the activities scheduled there. As the internship period lasts more than 20 weeks, there will be some slack for students to make up any time lost due to illness. If the days lost due to a student's illness cannot be made up due to the length of his or her illness, the internship student will be required to contact his supervising lecturer and the internship coordinator. It may then be decided to extend the internship, making it possible for the student to compensate the days lost.
Permitted aids		

Assessment: End Presentation Internship - 1920PRSTGC

Assessment objectives/criteria	**Contents**: The presentation will provide an insight into: ▪ The company and the department; ▪ The internship assignment, activities and objectives; ▪ Results: demonstration of product or design; ▪ Reflection on performance and learning objectives. **Presentation techniques**: ▪ Targeted and audience specific; ▪ Coherent and structured; ▪ Language use; ▪ Body language; ▪ Aids.

	Answers to the questions: ▪ Clear and persuasive.	
Details of assessments	At the end of the internship, the student will deliver a final presentation at Inholland Haarlem (or at the company). The supervising lecturer and the company supervisor will attend the final presentation.	
Strategies and teaching activities	Internship, preparation and delivery of a presentation.	
Compulsory attendance (See also Article 115 TER)	Yes	If a student is not able to attend the placement evaluation day to give his final presentation, he will be awarded a NoShow (1st attempt). A retake will then be scheduled (2nd attempt).
Permitted aids	Presentation tools (PC + beamer).	

Professional Skills Year 3 - 1920PROF3Z

Content of unit of study	In Years 3 and 4, students no longer attend classes for professional skills. In the last two years of their degree programme, professional skills includes one-to-one meetings with the coach and mandatory workshops. Students will have two scheduled one-to-one meetings with their professionalisation coach, but they can also request additional meetings. The aim of the meetings is to gauge students' academic progress (and to enable them to catch up in any areas where they are behind), to monitor the competences that they have achieved and to help them make choices with regard to a graduation track and placement. Personal circumstances that could have an adverse impact on a student's studies may also be grounds for a meeting with the study coach. The mandatory workshop is delivered by a guest lecturer from the IT working field and focuses on the labour market and applying for jobs. Students will prepare for the workshop in advance by completing an assignment. The workshops offered will help students choose their electives and a suitable graduation project and placement and with the goal of finding a job on completion of their studies.
Learning outcomes	**Professionalisation**: **6.3.1 Self-management skills** ▪ Can work independently, in a results-focused way, and can deal with stress in critical situations; ▪ Shows enterprise and initiative and is not afraid to take risks; ▪ recognises areas where he/she could do better and formulates learning objectives based on feedback and self-reflection; ▪ Is good at planning and organisation, pays attention to milestones and deadlines and meets obligations; ▪ Takes his/her task and role seriously. **6.3.2 Social-communicative ability** ▪ Can work effectively as part of a team; ▪ Can communicate effectively with people in a variety of positions; ▪ Can listen to and empathise with others' viewpoints; ▪ Can pass on knowledge, insights and skills to others; ▪ Can give and receive feedback; ▪ Can report on the results achieved and the process. **6.3.3 Awareness of social responsibility** ▪ Is aware of the importance of ethics and social values for an organisation and supports both; ▪ Can embrace diversity (people with different cultures and backgrounds); ▪ Shows respect and care for the people and things around them.
Requirements for participation in units of study (See also	First year successfully completed. Professional work/ graduation internship successfully completed.

Article 29 TER)	
Specific details	None.

Assessment: Professional Skills Year 3 - 1920PROF3A

Assessment objectives/criteria	**Assessment criteria** ▪ Reflecting on the relevant job requirements (including developments within the discipline and the professional field), relating these to own interests, strengths and weaknesses and formulating personal goals on this basis; ▪ Translating personal goals and learning needs into SMART objectives in a Personal Development Plan (PDP); ▪ *A structured approach to own academic and professional development in terms of knowledge, skills and attitude, in relation to Bachelor of ICT competences; ▪ Reflecting in a report on own personal and academic experiences, approach to studies, professional work placement and the results achieved; ▪ Taking action to develop own competences, knowledge and skills in relation to studies and future profession.	
Details of assessments	Written assignments and one-to-one meetings. At the end of Year 3, students will have a one-to-one meeting for which they will prepare a number of deliverables, such as a Personal Development Plan (PDP), a competence development report and a reflective report.	
Strategies and teaching activities	Assignments, portfolio structure and one-to-one meetings, workshop/guest lecture on the jobs market/applying for jobs and/or personal branding. Students work on their personal branding in conjunction with an external company and deliver an elevator pitch during the workshop.	
Compulsory attendance (See also Article 115 TER)	Yes	The professional skills workshop is interactive in nature. The session is used to discuss and share personal experiences and assignments. The focus is on sharing and feedback. Since the group process during the session is important, it is essential that all students attend the session. The individual talks with the coach are meant to monitor and assess the professional progress of the student and are therefore mandatory.
Permitted aids	None.	

Year 4

Basic curriculum

Semester 2

Graduation - 1914IN441Z

Content of unit of study	In the graduation project, the student is given the opportunity to independently conduct applied research in a complex situation and in a multidisciplinary environment and to apply his knowledge, insight and capabilities in an integrated manner in new or unknown circumstances. A graduation assignment must meet the following criteria: 1. The assignment is related to the professional profile of the study programme;

	2. With the assignment you can demonstrate competency control at level 3 start competent; 3. The company offers a context in which an optimal learning process can be guaranteed; 4. The assignment is a realistic reflection of the professional practice; 5. The assignment can be translated into a research question, which is elaborated in several sub-questions.
Learning outcomes	With the graduation research and product you must demonstrate that you can apply integrated at the level of starting competence (level 3): ▪ The competences Research and Professionalization; ▪ At least two of the professional competencies of your choice: analysis, advice, design, realization; ▪ At least one mastery indicator within the chosen professional competences.
Requirements for participation in units of study (See also Article 29 TER)	To graduate In order to start the graduation process, the following admission requirements apply: ▪ The propaedeutic phase has been achieved ▪ The 3rd year internship has been successfully completed. ▪ A minimum of 185 ECs were obtained in week 3 of the period prior to the start of graduation (or 195 ECs at the end of this period).
Specific details	The graduation project lasts a total of 20 weeks (100 working days) and represents a total of 29 EC.

Assessment: Graduation paper - 1914IN441A

Assessment objectives/criteria	▪ Quality of the problem analysis, research question and sub-questions ▪ Quality of research ▪ Quality of professional product ▪ Quality of the conclusions and recommendations ▪ Quality of the report ▪ Reflection (on research, product, competences and professional attitude)	
Details of assessments	Graduation is assessed on the basis of the Graduation Assessment Form for Information Technology Haarlem.	
Strategies and teaching activities	Graduation research with Written Report.	
Compulsory attendance (See also Article 115 TER)	Yes	The graduation project lasts a total of 20 weeks (100 working days), during which the student is required to be present at the graduation company. If a student does not meet the compulsory attendance requirements, he will receive an unsatisfactory mark for his graduation thesis and he will have to start the graduation again.
Permitted aids	n/a	

Assessment: Oral Exam - 1914IN441B

Assessment objectives/criteria	▪ Professional competence ▪ Oral communication; ▪ Reflection.	
Details of assessments	The student is able to justify and explain the graduation research orally.	
Strategies and teaching activities	Presentation	
Compulsory attendance (See also Article 115 TER)	Yes	If the student is not able to attend the oral exam, he will receive a No-Show (1st chance). Then a resit is scheduled (2nd chance).
Permitted aids	n/a	

Professional Skills Year 4 - 1917IN442Z

Content of unit of study	In Years 3 and 4, students no longer attend professional skills classes. In the last two years of their degree programme, professionals skills includes one-to-one meetings and mandatory workshops. Students will have two scheduled one-to-one meetings with their study coach, but they can also request additional meetings. The aim of the meetings is to gauge students' academic progress (and to enable them to catch up in any areas where they are behind), to monitor the competences that they have achieved and to help them make choices with regard to a graduation track and placement. Personal circumstances that could have an adverse impact on a student's studies may also be grounds for a meeting with the study coach. The mandatory workshop is delivered by a guest lecturer from professional practice and focuses on the jobs market and applying for jobs. Students will prepare for the workshop in advance by completing an assignment. The workshops offered will help students choose their electives and a graduation project and placement and with finding a job on completion of their studies.
Learning outcomes	**Professionalisation**: **6.3.1 Self-management skills** ▪ Can work independently, in a results-focused way, and can deal with stress in critical situations; ▪ Shows enterprise and initiative and is not afraid to take risks; ▪ Recognises areas where he/she could do better and formulates learning objectives based on feedback and self-reflection; ▪ Is good at planning and organisation, pays attention to milestones and deadlines and meets obligations; ▪ Takes his/her task and role seriously. **6.3.2 Social-communicative ability** ▪ Can work effectively as part of a team; ▪ Can communicate effectively with people in a variety of positions; ▪ Can listen to and empathise with others' viewpoints; ▪ Can pass on knowledge, insights and skills to others; ▪ Can give and receive feedback; ▪ Can report on the results achieved and the process. **6.3.3 Awareness of social responsibility** ▪ Is aware of the importance of ethics and social values for an organisation and supports both; ▪ Can embrace diversity (people with different cultures and backgrounds); ▪ Shows respect and care for the people and things around them.
Requirements for participation in units of study (See also Article 29 TER)	First year successfully completed. Professional work placement successfully completed.
Specific details	None

Assessment: Professional Skills Year 4 - 1917IN442A

Assessment objectives/criteria	**Assessment criteria** ▪ Reflecting on the relevant job requirements (including developments within the discipline and the professional field), relating these to own interests, strengths and weaknesses and formulating personal goals on this basis; ▪ Translating personal goals and learning needs into SMART objectives in a Personal Development Plan (PDP); ▪ *A structured approach to own academic and professional development in terms of knowledge, skills and attitude, in relation to Bachelor of ICT competences; ▪ Reflecting in a report on own personal and academic experiences, approach to studies, professional work placement and the results achieved; ▪ Taking action to develop own competences, knowledge and skills in relation to studies and future profession.
Details of	Written assignments and one-to-one meetings. At the end of Year 3, students will have a one-to-one

assessments	meeting for which they will prepare a number of deliverables, such as a Personal Development Plan (PDP), a competence development report and a reflective report.	
Strategies and teaching activities	Assignments, portfolio structure and one-to-one meetings, workshop/guest lecture on the jobs market/applying for jobs and/or personal branding. Students work on their personal branding in conjunction with an external company and deliver an elevator pitch during the workshop.	
Compulsory attendance (See also Article 115 TER)	Yes	The professional skills workshop is interactive in nature and is mandatory. The session is used to discuss and share personal experiences and assignments. The focus is on sharing and feedback. Since the group process during the session is important, it is essential that all students attend the session. The individual talks with the study coach are meant to monitor and assess the professional progress of the student and are therefore mandatory.
Permitted aids	None.	

Term 1

Electives
Big Data & AI 1 (Haarlem)

Project Big Data & AI: Design - 1922PBDAIZ

Content of unit of study	During the Big Data & AI semester, the students work in groups on four on a Big Data & AI project. The semester consists of two terms. This (Project Big Data & AI – Design) is the project of the first term. Every week there is project supervision in which a teacher monitors the planning, the progress and the group process. The students can also ask technical questions about the project during this supervision. Students come up with a plan of approach for a 'data science / computer vision / speech analysis' project.
Learning outcomes	Analyze ▪ 3.3. Make a quantitative and / or qualitative analysis of the current and future situation in the field of, for example, policy, strategy, alignment and architecture, using common methods (BP); ▪ 3.8. Analyzing Big Data and describing cause-effect relationships (IS); ▪ 3.12. The preparation of an analysis report (target group, objective, context, information and communication needs, visualization, usability and use), and relate this to trends in ICT and / or digital media products (BP). To advise: ▪ 3.6. Advising on internal and external alignment between business and IT (alignment and governance) based on the (network) organization strategy and objectives (BP). Realize: ▪ 2.3. Building and making available a software system that consists of several subsystems, making use of existing components (SW). Professionalize: ▪ 3.1 Self-steering ability;

	■ 3.2 Social communication skills; ■ 3.3 Creativity and problem-solving ability; ■ 3.4 Awareness of social responsibility. <u>Investigative ability:</u> ■ 3.1 Mapping the relevant aspects of a complex problem; ■ 3.2 Clear formulation of goal and research questions based on the problem analysis; ■ 3.5 Collecting, analyzing and interpreting the relevant research data; ■ 3.6 Link substantiated conclusions and recommendations to research results
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None.

Assessment: Cleaned/prepared dataset - 1922PBDAIA

Assessment objectives/criteria	The student is able to: ■ Discovering, demonstrating and predicting cause-effect changes from a large collection of data (Big Data) using artificial intelligence techniques. ■ The student can present this in a presentation to the client, also makes a proof-of-concept application to validate the research and describes his findings in an advice report.	
Details of assessments	*Other method (A) / assessment* The student deliveres the folllowing products in preparation for the next term: ■ A. Cleaned/prepared dataset (30%), The dataset is collected, cleaned and prepared for training a model. It consists of at least 100 files (CV), 1000 entries (DS) or a high enough number for significant analysis in equivalent/similar cases. It has been atomized where applicable.	
Strategies and teaching activities	16 Contacthours: Project support / consultancy + Unaccompanied project hours	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, internet, VMware Image.	

Assessment: Trained Model - 1922PBDAIB

Assessment objectives/criteria	The student is able to: ■ Discovering, demonstrating and predicting cause-effect changes from a large collection of data (Big Data) using artificial intelligence techniques. ■ The student can present this in a presentation to the client, also makes a proof-of-concept application to validate the research and describes his findings in an advice report.
Details of assessments	*Other method (A) / assessment* The student delivers the folllowing products in preparation for the next term: ■ B. Trained Model (40%) A description of the trained model has been given which includes at least, the programming/scripting language/chosen, the algorithm chosen, and the number of iterations chosen to train the model. Also a division between training, test and/or validation data.
Strategies and	16 Contacthours: Project support / consultancy + Unaccompanied project hours

teaching activities Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, internet, VMware Image.	

Assessment: TFGD - 1922PBDAIC

Assessment objectives/criteria	The student is able to: ▪ Discovering, demonstrating and predicting cause-effect changes from a large collection of data (Big Data) using artificial intelligence techniques. ▪ The student can present this in a presentation to the client, also makes a proof-of-concept application to validate the research and describes his findings in an advice report.	
Details of assessments	*Other method (A) / assessment* The student delivers the folllowing products in preparation for the next term: ▪ C. TFGD* [Technical, Functional and Graphical Design for PoC] (30%) A technical, functional AND graphical design is produced that gives a reproducable insight into the inner workings of the foreseen proof-of-concept. To deliver a quality product, UML, DooML or a similar design /modeling language has been used in combination with a wireframe / click model (Axure/XD/Figma or similar).	
Strategies and teaching activities	16 Contacthours: Project support / consultancy + Unaccompanied project hours	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, internet, VMware Image.	

Big Data & AI Fundamentals - 1922BDAIFZ

Content of unit of study	The student is able to: ▪ Recognize Big Data architectures ▪ Reproduce the theory behind Big Data ▪ Apply learned models ▪ The student can analyze a scientific paper and apply the learned theory and models to it. ▪ The student reports his findings in a presentation that is tailored to the target group (s). ▪ The student makes clear to those involved how he arrived at the presented findings.
Learning outcomes	Realize: ▪ 3.4. Building and making available a software system that connects with existing systems, according to the designed architecture using existing frameworks (SW) Investigative ability:

	▪ 3.2 Clear formulation of goal and research questions based on the problem analysis; ▪ 3.5 Collecting, analyzing and interpreting the relevant research data;
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None.

Assessment: Big Data & AI Fundamentals - 1922BDAIFA

Assessment objectives/criteria	The student can demonstrate and apply the knowledge and skills in the field of Big Data & AI (big Data & AI Fundamentals) theory.	
Details of assessments	*Other method (A) / assessment* Assessment (in the form of a final presentation) + Interim individual presentation + Report on paper	
Strategies and teaching activities	16 Contacthours: Hearing and seminars Presentations.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, internet, papers.	

Computer Vision 1 - 1922CVIS1Z

Content of unit of study	The student is able to: ▪ Analyze image or video data using a computer vision model, library or technique;
Learning outcomes	<u>Realize:</u> ▪ 3.4. Building and making available a software system that connects with existing systems, according to the designed architecture using existing frameworks (SW) <u>Investigative ability:</u> ▪ 3.2 Clear formulation of goal and research questions based on the problem analysis; ▪ 3.5 Collecting, analyzing and interpreting the relevant research data;
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None.

Assessment: Computer Vision 1 - 1922CVIS1A

Assessment objectives/criteria	The student can demonstrate and apply the knowledge and skills in the field of Computer Vision on a basic level (image processing, simple object detection).	
Details of assessments	*Written exam (S)* All skills and knowledge will be tested during a computer exam (open book).	
Strategies and teaching activities	16 Contacthours: Hearing and seminars + Presentations.	
Compulsory	No	

attendance (See also Article 115 TER)		
Permitted aids	PC (own laptop), internet, (computer vision) software, papers.	

Data Mining & Statistics - 1922DMSTAZ

Content of unit of study	The student is introduced to techniques and best practices in the field of Data Mining.
Learning outcomes	**Analyze**: ▪ 3.8. Analyzing Big Data and describing cause-effect relat. (IS) **Investigative ability**: ▪ 3.6 Link substantiated conclusions and recommendations to research results.
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: ▪ Propedeuse achieved. ▪ Placement with a satisfactory completion.
Specific details	None.

Assessment: Data Mining & Statistics - 1922DMSTAA

Assessment objectives/criteria	The student can: ▪ Compile a data set based on raw (unstructured) data using a tool and / or algorithm; ▪ Perform a regression analysis on a data set or a combined data set using a tool and / or algorithm; ▪ Perform a classification on a data set or a combined data set using a tool and / or algorithm; ▪ Perform a clustering on a data set or a combined data set using a tool and / or algorithm; ▪ Perform a recommendation on a data set or a combined data set using a tool and / or algorithm;	
Details of assessments	SZ (Written without test session) The student builds a portfolio about the knowledge and skills gained in the field of Data Mining. This consists of four assignments: ▪ Regression ▪ Classification ▪ Clustering ▪ Recommendation Details of each assignment will be provided on Moodle. Each assignment must be a pass, when all are passed the average grade will be the module grade.	
Strategies and teaching activities	Hearing and seminars, guest lectures and workshops.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, internet, Data Mining / Data Science Tools (e.g.. Python RapidMiner, Splunk, etc.)	

Python & Tools - 1922PYTHTZ

Content of unit of study	The student is able to: ▪ Use Python and other tools to tackle data (science) problems;
Learning outcomes	Realize: ▪ 3.4. Building and making available a software system that connects with existing systems, according to the designed architecture using existing frameworks (SW) Investigative ability: ▪ 3.2 Clear formulation of goal and research questions based on the problem analysis; ▪ 3.5 Collecting, analyzing and interpreting the relevant research data;
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None.

Assessment: Python & Tools - 1922PYTHTA

Assessment objectives/criteria	The student can demonstrate and apply the knowledge and skills using Python, R or similar data science tools. To give students a head start Python as a separate course has been added. In this course Python & Tools for Data Science, we will also talk about R, RapidMiner, SPSS, etc.	
Details of assessments	*Other method (A) / assessment* Small Assignment	
Strategies and teaching activities	8 contact hours: several workshops throughout the term.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, internet, papers, VM, Anaconda, R, RapidMiner, SPSS, data (science) tools.	

Research Big Data - 1922RESBDZ

Content of unit of study	The module focuses on the further development of research skills. The emphasis is on formulating good research questions, finding, assessing and using good sources and using an empirical research method to answer these questions. This module is a preparation for the graduation project in which doing research to support the final product is an important part. For this module, you write a paper together with a fellow student on a topic related to your minor. This paper is an elaboration of a well-founded research question which you will answer by means of desk research (e.g. on the basis of literature) and field research. For this paper, in addition to desk research, you base yourself on at least one other empirical research method (field research). For example, you can

	interview an expert or conduct a survey among your target group. You can also choose another method. Peer review is an important element in this module
Learning outcomes	**Professionalize**: 6.3.1 Self-steering ability: • Can detect, integrate and apply relevant knowledge and insights in new situations. • Takes his own task and role seriously. 6.3.2 Social communication skills: • Can work together effectively in a team; • Can give and receive feedback; • Expresses effectively in writing in correct, understandable and appropriate Dutch. 6.3.3 Creativity and problem-solving ability: • Comes up with new ideas, approaches or insights. • Comes up with different solutions to a problem. **Investigative ability**: • 7.3.1 Mapping the relevant aspects of a complex problem; • 7.3.2 Clear formulation of goal and research questions based on the problem analysis; • 7.3.3 Making substantiated choices for research methods and instruments. • 7.3.4 Selecting and using relevant, reliable and current sources to support the research; • 7.3.5 Collecting, analyzing and interpreting the relevant research data; • 7.3.6 Link substantiated conclusions and recommendations to research results.
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Research Big Data - 1922RESBDA

Assessment objectives/criteria	Research is reported in the form of a paper that is assessed on: ▪ The quality of the research questions and objective ▪ The quality of desk research ▪ The quality of the field research ▪ The quality of the analysis and the conclusion ▪ The quality of reporting (language and readability) Active participation in the peer review process is required.	
Details of assessments	Written assignment: research paper on an IT subject, to be uploaded in GardeWork.	
Strategies and teaching activities	Workshops about research methods, also the research proposals of the students are discussed. Peer review Consultation with the research teacher	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Basically everything; consult the teacher in case of doubt.	

Electives
Cloud Computing 1 (Haarlem)

Cloud Databases - 1920CLD01Z

Content of unit of study	In this unit of study, the student is introduced to database solutions within a cloud environment, and related development and design patterns. The student learns how to set up his database to ensure scalability and resilience.
Learning outcomes	**Realize**: ■ 3.2 Realizing public or private cloud-based infrastructure and services, taking into account all requirements (IS).
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed; 2. The 3rd year internship has been successfully completed.
Specific details	None.

Assessment: Cloud Databases - 1920CLD01A

Assessment objectives/criteria	The student develops a database solution in a cloud environment in the form of an individual assignment, which also requires communication with the database from code. This solution is set up correctly according to the applicable design paradigms.	
Details of assessments		
Strategies and teaching activities	During the lessons, theory and practice alternate. Each theory block is concluded with an exercise that can be worked on in class. The teacher is present for support. The exercises also form the homework.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Server Side Programming - 1918MOBL2Z

Content of unit of study	This unit of study focuses on the development of a RESTful API in a cloud environment.
Learning outcomes	**Realize**: ■ 3.2 Realization of public or private cloud-based infrastructure and services, taking into account all requirements (IS).
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse achieved. Vocational training internship with a satisfactory completion.
Specific details	None

Assessment: Server Side Programming - 1918MOBL2A

Assessment objectives/criteria	The student develops a RESTful API, using tools, frameworks and libraries.

Details of assessments	The student develops a RESTful API in a cloud environment by using. the tools, frameworks and libraries used in the workshops.	
Strategies and teaching activities	Theory and practice are alternated during the lessons. Each theory block is concluded with an exercise that can be worked on in class. The teacher is present for support. The exercises also form the homework.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Research Cloud 1 - 1922CLD03Z

Content of unit of study	This module focuses on the research capabilities that play a role in the project assignment. This concerns a group assignment. This term focuses on making a research thesis building plan but also one or more sub-questions will already be worked out. This module can be considered as preparation for independent research in the graduation process.
Learning outcomes	**6.Professionalize**: ▪ 6.3.2 Social communicative ability; ▪ 6.3.3 Creativity and problem-solving skills; ▪ 6.3.4 Awareness of social responsibility. **7. Research**: ▪ 7.3.1 Identifying the relevant aspects of a complex problem; ▪ 7.3.2 Clear formulation of purpose and research questions based on the problem analysis; ▪ 7.3.3 Making substantiated choices of research methods and instruments; ▪ 7.3.4 Select and use relevant, reliable and current sources to support the research; ▪ 7.3.5 Collect, analyze and interpretation of the relevant research data; ▪ 7.3.6 Connect substantiated conclusions and recommendations to research results; ▪ 7.3.7 Critically reflecting on the approach of the research and the context in which it was carried out.
Requirements for participation in units of study (See also Article 29 TER)	Requirement for participation in elective education: ▪ Propedeuse completed ▪ Internship with a satisfactory completion
Specific details	None

Assessment: Research Cloud 1 - 1922CLD03A

Assessment objectives/criteria	Documentation will be delivered that will be assessed on: 1. Quality of the problem analysis, research question and sub questions 2. Quality of the research (data gathering and analysis) ▪ Quality of the report; An action plan is delivered to which a Go / No go decision is linked.
Details of assessments	Written submission assignment: documentation in which reports are made of research that is in function of the project assignment. This is a group assignment.
Strategies and teaching activities	Lectures in which theory and processing assignments are discussed. Project support with regard to carrying out the research and writing the paper. Peer review sessions (participation is mandatory)

Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	See material list	

Project Cloud API - 1920CLD04Z

Content of unit of study	The student goes through the entire process of developing a cloud-based RESTful API in groups, whereby the application stack makes use of an SQL / NoSQL database environment. The student develops a proof of concept website or other client that demonstrates correct functioning of the developed API. The student demonstrates the scalability of the API by means of a well-designed load testing environment with which relevant information can be gathered regarding the scalability of the developed API. The student demonstrates that a complete software release cycle (development, staging, production) from the source code to the production environment can be fully executed. The student demonstrates that the environment he has developed is manageable. The aim is to work as much as possible with clients from outside the study program.
Learning outcomes	**Manage to:** ▪ 2.2 Apply principles to manage and monitor a software development process (SW;) ▪ 3.1 Set up and run a public or private cloud-based infrastructure (IS) ▪ Carrying out configuration, change and release management (SW). **Analyze:** ▪ 3.7 Mapping integration and migration problems (SW); ▪ 3.10 Specify a distributed computer system, including timing, resource utilization, and performance (HW). **Design**: ▪ 2.3 Prepare a technical design for an infrastructure with associated security based on functional and non-functional requirements (IS); ▪ 2.4 Drawing up a design for a software system, taking into account the use of existing components and libraries; use design principles and / or quality criteria (SW;) ▪ 3.2 Designing a cloud-based infrastructure taking into account all requirements (IS); ▪ 3.4 Drawing up a test strategy for system tests (SW;) ▪ 3.5 Designing a distributed computer system, including determination of actuators, sensors, timing, resource utilization, and performance (HW.) **Realize**: ▪ 2.2 Setting up an infrastructure that meets the requirements in the areas of performance, usability, security and compliance (IS); ▪ 3.2 Realizing public or private cloud-based infrastructure and services, considering all requirements (IS); ▪ 3.5 Using test automation when performing tests (SW); ▪ 3.6 Draw up and execute an acceptance procedure, eg in a virtual environment, including aspects such as timing, resource use and performance (H). **Professionalize** level 3 - Level of competency required by a professional at the start of his career **Researching** level 3 - Level of competency required by a professional at the start of his career
Requirements for participation in units of study (See also	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed;

Article 29 TER)	2. The 3rd year internship has been successfully completed;
Specific details	None

Assessment: API model documentation - 1916CLD04A

Assessment objectives/criteria	The documentation will be assessed against the following criteria: ▪ The student can provide convincing insight that the API to be developed is a suitable solution for the client's problem; ▪ The student makes clear how the API to be developed will be designed; ▪ The design concepts associated with RESTful APIs have been used correctly.	
Details of assessments	The student must produce a document in accordance with industry standards, which clearly demonstrates how the API can be communicated.	
Strategies and teaching activities	During the fortnightly project supervision, the student can ask questions regarding problems that arise in the design and / or realization of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, required software.	

Assessment: Presentation API model - 1916CLD04B

Assessment objectives/criteria	The presentation will be assessed based on the following criteria: ▪ The student can provide convincing insight that the API to be developed is a suitable solution for the client's problem; ▪ The student makes clear how the API to be developed will be designed; ▪ The design concepts associated with RESTful APIs have been used correctly.	
Details of assessments	The student gives a visually supported presentation of his API design.	
Strategies and teaching activities	During the fortnightly project supervision, the student can ask questions regarding problems that arise during the design and / or implementation of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	No	If the student is unable to attend the presentation, he will receive a NoShow (1st chance). A resit is then scheduled (2nd chance).
Permitted aids	PC, required software.	

Assessment: Code review - 1919CLD04C

Assessment objectives/criteria	The documentation, code, and tests will be assessed for usability and completeness. The client's goal must be correctly and appropriately resolved from a server perspective by means of a serverless cloud solution. This solution must be adequately tested by means of automated tests.	
Details of assessments	Cesuur: 5.5	
Strategies and teaching activities	During the bi-weekly project supervision, the student can ask questions regarding problems that arise during the design and / or implementation of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Assessment: Code assessment - 1916CLD04D

Assessment objectives/criteria	The student can demonstrate that he has made a relevant contribution to the project by indicating which parts he has developed himself. The student can demonstrate that he has actually developed the above-mentioned parts himself by

	explaining how they work and answering questions about them. The student can explain and substantiate how he came to the choice of certain programming solutions. The student can explain how the code developed by him interacts with other components. The student can add clear comments where it makes sense to comment on code. The student can give examples of programming solutions that have been discussed in the team, and broadly state what the considerations and / or problems were. The student can conform to an agreed coding standard.	
Details of assessments	During the assessment, the student demonstrates his / her developed part of the application and answers questions about it. Cesuur: 5.5	
Strategies and teaching activities	During thefortnightly project supervision, the student can ask questions regarding problems that arise during the design and / or implementation of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	No	If the student is unable to attend the oral exam, he will receive a NoShow (1st chance). A resit is then scheduled (2nd chance).
Permitted aids	PC, required software.	

Assessment: Presentation final product - 1916CLD04E

Assessment objectives/criteria	The presentation will be judged according to the following criteria: ▪ Skills ▪ Oral communication ▪ Accountability	
Details of assessments	The student can justify and explain the delivered documents orally.	
Strategies and teaching activities	During the bi-weekly project supervision, the student can ask questions regarding problems that arise during the design and / or implementation of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	No	If the student is unable to attend the presentation, he will receive a NoShow (1st chance). A resit is then scheduled (2nd chance).
Permitted aids	PC, required software	

Electives
Mobile Development 1 (Haarlem)

Mobile Platforms - 1918MOBL1Z

Content of unit of study	In these 3 workshops, students learn to develop an application for the following 2 mobile platforms: ▪ iOS ▪ Android
Learning outcomes	**Design**: ▪ 3.1. Designing ICT and / or digital media products from a self-designed (innovative) functionality, interaction form, style and / or service, including. User experience, usability testing and innovative technology (GI) **Realize**: ▪ 3.1 Realization and testing of dynamic ICT and / or digital media products using innovative

	technologies (GI); ▪ 3.4. Building and making available a software system that connects to existing systems, according to the designed architecture using existing frameworks (SW).
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed; 2. The 3rd year internship has been successfully completed;
Specific details	None.

Assessment: Apple - 1918MOBL1A

Assessment objectives/criteria	The student: ▪ Shows knowledge of iOS platform specific features; ▪ Can design an interface based on functional requirements; ▪ Shows knowledge of the lifecycle of an iOS app; ▪ Can apply data binding to link data to user interface elements; ▪ Can use Swift to develop iOS apps; ▪ Can use (secure) local storage; ▪ Can communicate with a backend server; ▪ Can integrate 3rd party libraries / code into his project; ▪ Can make use of programming concepts used in the market in relation to (mobile) application development, including use of MVC.	
Details of assessments	The student individually creates a mobile application based on an assignment. This application is assessed by the teacher.	
Strategies and teaching activities	Before the workshops, the student receives lessons in introduction to Swift. Workshop of 3 whole days. In these workshops, the student follows presentations and works on assignments.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Permitted AIDS PC, software for creating the application and internet.	

Assessment: Android - 1918MOBL1B

Assessment objectives/criteria	The student: ▪ Shows knowledge of Andoid platform specific features; ▪ Can design an interface based on functional requirements; ▪ Shows knowledge of the life cycle of an Andoid app; ▪ Can apply data binding to link data to user interface elements; ▪ Can use Kotlin to develop Andoid apps; ▪ Can use (secure) local storage; ▪ Can communicate with a backend server; ▪ Can integrate 3rd party libraries / code into his project; ▪ Can make use of programming concepts used in the market in relation to (mobile) application development, including use of MVC.	
Details of assessments	The student individually creates a mobile application based on an assignment. This application is assessed by the teacher.	
Strategies and teaching activities	Before the workshops, the student receives lessons introduction to Kotlin. Workshop of 3 whole days. In these workshops, the student follows presentations and works on assignments.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, software for creating the application and internet.	

Mobile User Interface Design - 1920MOBL3Z

Content of unit of study	In this workshop, students learn to create an interactive click model with Adobe XD.
Learning outcomes	**Design**: ▪ 3.1 Designing ICT and / or digital media products from a self-designed (innovative) functionality, form of interaction, style and / or service, including user experience, usability testing and innovative technology (GI). **Analyze**: ▪ 3.1 Mapping trends in communication and design repertoire of ICT and / or digital media products (GI); ▪ 3.6 Perform a requirement analysis for a multi-stakeholder software system in a context of existing systems (SW).
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed; 2. The 3rd year internship has been successfully completed;
Specific details	None.

Assessment: Mobile User Interface Design - 1920MOBL3A

Assessment objectives/criteria	In this workshop, students make a copy of a Mobile app in Adobe XD. The aim is to train skills with this tool so that simple concepts can be quickly modeled for testing. There is a choice of different applications. The assessment method of the created app: **Functionality (40%),** Relevant and essential functionality is "testable" in the prototype **Design (30%),** The design is graphically an exact copy of the original example. **Detail (15%),** "Secondary" functionality (eg settings) has been elaborated in detail. **User XD (15%)** The functionality of the Adobe XD product has been widely used. Symbols, repeat grids, triggers and animations have been used. (not only screen dumps are connected!)	
Details of assessments	The students make a click model based on a case study. With this click model, the students write and generate the requested documentation. In the last workshop, the students present the click model. Documentation and click model are assessed for a grade.	
Strategies and teaching activities	Workshop of 3 whole days. In these workshops, students receive presentations and work on assignments.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, software for making a click model and internet.	

Project Application Design - 1920MOBL4Z

Content of unit of study	The project group, consisting of three or four students, has a real client for the project. The project group will deliver the following components: ▪ Digital click model ▪ Design document (including scenarios, use cases, elaboration of click model, user interface design, technical specifications, non-functional specifications)
Learning outcomes	**Analyze**: ▪ 3.1. Mapping trends in communication and design repertoire of ICT and / or digital media products (GI); ▪ 3.2. Preparing an analysis report (target group, objective, context, information and communication need, visualization, usability and Analyzing), and relating this to trends in ICT and / or digital media products (GI); ▪ 3.4. Researching trends in the field of ICT infrastructure based on (international) technological, economic and social developments and innovations (IS); ▪ 3.5 Perform a requirements analysis for a business infrastructure to identify functional and non-functional requirements (IS); ▪ 3.6. Perform a requirement analysis for a software system with different stakeholders in a context of existing systems (SW). **Design**: ▪ 3.1. Designing ICT and / or digital media products from a self-designed (innovative) functional, form of interaction, style and / or service, including user experience, usability tests and innovative technology (GI); ▪ 3.3. Establish a software architecture for a software system, consisting of already existing and new systems, considering quality features and stakeholders (SW) ▪ **Realize :** ▪ 3.1 Prepare a software architecture for a software system, consisting of existing and new systems, considering quality features and stakeholders (SW). **6. Professionalizing**: ▪ 6.3.2 Social communicative ability; ▪ 6.3.3 Creativity and problem-solving ability; ▪ 6.3.4 Awareness of social responsibility. **7. Research skills**: ▪ 7.3.1 Mapping the relevant aspects of a complex problem; ▪ 7.3.2 Clear formulation of purpose and research questions based on the problem analysis; ▪ 7.3.3 Make well-founded choices of research methods and instruments; ▪ 7.3.4 Select and use relevant, reliable and current sources to support the research; ▪ 7.3.5 To Collect, analyze and interpretative the relevant research data; ▪ 7.3.6 Connect substantiated conclusions and recommendations to research results; ▪ 7.3.7 Reflect critically on the approach to the research and the context in which it was conducted.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: ▪ 1. The foundation year has been passed; ▪ 2. The 3rd year internship has been successfully completed;
Specific details	None.

Assessment: Project Application Design - 1920MOBL4A

Assessment objectives/criteria	Project Application Design Visual Design: ▪ The house style (brand, identity) of the client been correctly applied (style guide) in the design. If the house style has been applied in a different way within the design, the student must be able to substantiate his actions; ▪ Content (texts) can be read optimally due to good alignment, attention to the line, length of the line (max. 12 words on a line), clear color contrast from text color to background color;

	▪ No unnecessary white space, all parts are logically connected and form a whole; ▪ The images must fit the application and the target group. Icons or buttons must match their function and therefore clearly recognizable as his; ▪ Shaped functionalities are applied consistently. <u>Click model:</u> ▪ Flow diagram with the correct icons; ▪ Flow diagram is consistent with the click model; ▪ Flow diagram is linked to the click model; ▪ Use of Dynamic Panels (creativity is assessed); ▪ Use of Masters; ▪ Click models has no dead-ends; ▪ Click model has clearly described elements; ▪ Click model has Splash screen; ▪ Click model has Home screen icon; ▪ Feedback User feedback - Each click gives feedback to the user (by means of a pop-up, color change, upcoming screen, text, etc.); ▪ Click model for iOS, Android and Windows Phone uses platform related Widgets; ▪ Click model for iOS, Android and Windows Phone adheres to the platform Interface Guidelines; ▪ Minimum: Correct resolution; ▪ Minimal: Correct use of the UI elements; ▪ Documentation has everything labeled; ▪ No spelling mistakes in documentation.
Details of assessments	The project group, consisting of three or four students, has a real client for the project. The project group will deliver the following components: ▪ A digital click model, functional and representative of the chosen solution direction; Design document (including scenarios, use cases, elaboration of click model, user interface design, technical specifications, non-functional specifications) The Click model is presented to the client at the end of the teaching period.
Strategies and teaching activities	During the project kick-off, the students choose a client. In consultation with the client, the students deliver a design for the application to be built. During the project, students receive project guidance and support lessons.
Compulsory attendance (See also Article 115 TER)	Yes — All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	

Research Mobile 1 - 1922MOBL8Z

Content of unit of study	This module focuses on the research capabilities that play a role in the project assignment. This concerns a group assignment. This term focuses on making a research thesis building plan but also one or more sub-questions will already be worked out. This module can be considered as preparation for independent research in the graduation process.
Learning outcomes	**<u>7. Research skills</u>**: ▪ 7.3.1 Identifying the relevant aspects of a complex problem;

	■ 7.3.2 Clear formulation of purpose and research questions based on the problem analysis; ■ 7.3.3 Making well-founded choices of research methods and instruments; ■ 7.3.4 Select and use relevant, reliable and current sources to support the research; ■ 7.3.5 Collecting, analyzing and interpreting the relevant research data; ■ 7.3.6 Connect substantiated conclusions and recommendations to research results; ■ 7.3.7 Reflect critically on the approach to the research and the context in which it was conducted.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: ■ 1. The foundation year has been passed; ■ 2. The 3rd year internship has been successfully completed.
Specific details	None.

Assessment: Research Mobile 1 - 1922MOBL8A

Assessment objectives/criteria	Documentation will be provided that will be assessed on: 1. Quality of the problem analysis, research question and sub questions 2. Quality of the research (data gathering and analysis) 3. Quality of the report; Before the document to be assessed, halfway through the period, an action plan is delivered to which a Go / No go decision is linked.	
Details of assessments	Written submission assignment: documentation in which reports are made of research that is in function of the project assignment. This is a group assignment.	
Strategies and teaching activities	Lectures in which theory and processing assignments are discussed. Project support with regard to carrying out the research and writing the paper. Peer review sessions (participation is mandatory)	
Compulsory attendance (See also Article 115 TER)	No	All projects are subject to compulsory attendance and active participation (see Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None.	

Term 2

Electives
Cloud Computing 2 (Haarlem)

Cloud Infrastructure - 1922CLD05Z

Content of unit of study	
Learning outcomes	
Requirements for participation in units of study (See also Article 29 TER)	
Specific details	

Assessment: Cloud Infrastructure - 1922CLD05A

Assessment objectives/criteria		
Details of assessments		
Strategies and teaching activities		
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Dev/Ops and SRE - 1922CLD06Z

Content of unit of study	
Learning outcomes	
Requirements for participation in units of study (See also Article 29 TER)	
Specific details	

Assessment: Dev/Ops and SRE - 1922CLD06A

Assessment objectives/criteria		
Details of assessments		
Strategies and teaching activities		
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Microservices Architecture - 1922CLD07Z

Content of unit of study	
Learning outcomes	
Requirements for participation in units of study (See also Article 29 TER)	
Specific details	

Assessment: Microservices Architecture - 1922CLD07A

Assessment objectives/criteria		
Details of assessments		
Strategies and teaching activities		
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Project Cloud API 2 - 1922CLD08Z

Content of unit of study	
Learning outcomes	
Requirements for participation in units of study (See also Article 29 TER)	
Specific details	

Assessment: Project Cloud API 2 - 1922CLD08A

Assessment objectives/criteria		
Details of assessments		
Strategies and teaching activities		
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Research Cloud 2 - 1922CLD09Z

Content of unit of study	During this period research is carried out within the framework of the project. Whereas in period 4.1 the emphasis was on making a research design, it is now largely about collecting and analyzing data: systematic answers are sought to sub-questions which lead to a conclusion and recommendations. This part can be considered as a focused preparation for the individual research in the graduation phase.
Learning outcomes	**6. Professionalization:** ▪ 6.3.2 Social communicative ability; ▪ 6.3.3 Creativity and problem solving skills; ▪ 6.3.4 Awareness of social responsibility. **7. Research skills:** ▪ 7.3.1 Map out the relevant aspects of a complex problem; ▪ 7.3.2 Clearly formulate the goal and research questions based on the problem analysis; ▪ 7.3.3 Make substantiated choices concerning research methods and instruments; ▪ 7.3.4 Select and use relevant, reliable and up-to-date sources to support the research; ▪ 7.3.5 Collect, analyse and interpret the relevant research data; ▪ 7.3.6 Derive substantiated conclusions and recommendations from research results. ▪ 7.3.7 Critically reflect on the research approach and the context in which it was conducted.
Requirements for participation in units of study (See also Article 29 TER)	▪ Propedeuse completed. ▪ Internship completed satisfactory.
Specific details	None.

Assessment: Research Cloud 2 - 1922CLD09A

Assessment objectives/criteria	An investigation report (group product) is submitted that is assessed on: 1. Quality of the problem analysis, exploration and research questions 2. Quality of the research (methodologies, data gathering, data analysis) 3. Quality of the conclusions and recommendations 4. Quality of the reporting (text and language) 5. Quality of the evaluation and reflection (on research process and collaboration) and competency report	
Details of assessments	Written thesis: based on the graduation thesis.	
Strategies and teaching activities	Lectures in which theory and processing assignments are discussed. Project consult with regard to carrying out the research and writing the paper. Peer review activities (Which are mandatory)	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Electives
Mobile Development 2 (Haarlem)

Research Mobile 2 - 1920MOBL6Z

Content of unit of study	In this period, work will continue on the research launched in period 1, which will take place within the context of the Mobile Applications project, which is now mainly concerned with carrying out: searching systematically for answers to sub-questions to arrive at a conclusion and recommendations. This part can be considered as a focused preparation for the independent research in the graduation process.
Learning outcomes	**6. Professionalize:** ▪ Social communicative ability; ▪ 6.3.3 Creativity and problem-solving skills; ▪ 6.3.4 Awareness of social responsibility. **7. Research skills:** ▪ 7.3.1Mapping the relevant aspects of a complex problem; ▪ 7.3.2 Clear formulation of purpose and research questions based on the problem analysis. ▪ 7.3.3 Making well-founded choices of research methods and instruments; ▪ 7.3.4 Select and use relevant, reliable and current sources to support the research; ▪ 7.3.5 Collection, analysis and interpretation of the relevant research data; ▪ 7.3.6 Connect substantiated conclusions and recommendations to research results; ▪ 7.3.7 Reflect critically on the approach to the research and the context in which it was conducted.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: ▪ 1. Propedeuse completed; ▪ 2. The 3rd year internship has been successfully completed.
Specific details	None.

Assessment: Research Mobile 2 - 1920MOBL6A

Assessment objectives/criteria	A report will be delivered that will be assessed on: 1. Quality of the problem analysis, exploration and research questions 2. Quality of the research (methodologies, data gathering, data analysis) 3. Quality of the conclusions and recommendations 4. Quality of the reporting (text and language) 5. Quality of the evaluation and reflection (on research process and collaboration) and competency report	
Details of assessments	Written hand-in assignment: report based on the example of the graduation thesis. This is a group assignment.	
Strategies and teaching activities	Lectures in which theory and processing assignments are discussed. Project supervision with regard to carrying out the research and writing the report. Peer review activities (Which are mandatory)	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	See material.	

Project Mobile Application - 1922MOBL7Z

Content of unit of study	The project group, consisting of three or four students, has a real client for the project. The project group will deliver the following components: ▪ Working App (individual assessment); ▪ Presentation.
Learning outcomes	**Analyze:** ▪ 3.9. Describe security aspects of computer systems that are linked to or via (public) networks (SW). **Design:** ▪ 3.1. Designing ICT and / or digital media products from a self-designed (innovative) functionality, interaction form, style and / or service, including user experience, usability testing and innovative technology (GI); ▪ 3.3. Prepare a software architecture for a software system, consisting of existing and new systems, considering quality features and stakeholders (SW). **Realize:** ▪ 3.1. Realization and testing of dynamic ICT and / or digital media products using innovative technologies (GI); ▪ 3.4. Building and making available a software system that connects to existing systems, according to the designed architecture using existing frameworks (SW). **Professionalize** **6.3.1 Self-steering ability** ▪ Can operate independently, result-oriented and stress-resistant in critical situations; ▪ Is entrepreneurial, shows initiative and dares to take risks; ▪ Recognizes own points of attention and formulates learning objectives based on feedback and self-reflection; ▪ Can plan and organize well, monitors milestones and deadlines, and keeps appointments; ▪ Is able to detect, integrate and apply relevant knowledge and insights in ever new situations; ▪ Takes own task and role seriously. **6.3.2 Social communicative ability** ▪ Can work effectively in a team; ▪ Can communicate effectively with people in different positions; ▪ Can listen to and put himself in another person's point of view; ▪ Can transfer knowledge, insights and skills to others; ▪ Can give and receive feedback. ▪ Expresses himself orally and in writing effectively in correct, understandable and appropriate Dutch; ▪ Can account for the results achieved and the process. **6.3.3 Creativity and problem-solving skills** ▪ Takes substantiated decisions based on available information and analysis and comes up with workable solutions; ▪ Comes with new ideas, approaches or insights; ▪ Comes with different solutions to a problem. **6.3.4 Awareness of social responsibility** ▪ Is aware of the importance of ethics and social values for an organization and supports them; ▪ Can deal with diversity (people with different cultures and backgrounds); ▪ Shows respect and takes care of the people and things around them
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: ▪ 1. The foundation year has been passed; ▪ 2. The 3rd year internship has been successfully completed;
Specific details	None.

Assessment: Mobile app bèta version - 1915MOBL7A

Assessment objectives/criteria	The application must be functionally almost complete: ▪ Has the house style (brand, identity) of the client been correctly applied (style guide) in the design. If the house style has been applied in a different way within the design, the student must be able to substantiate his actions; ▪ Content (texts) can be read optimally by good alignment, attention to the line, length of the line (max. 12 words on a line), clear color contrast from text color to background color; ▪ No unnecessary white space, all parts are connected in a coherent way and together form a whole; ▪ The images must fit the application and the target group. Icons or buttons must match their function and therefore clearly recognizable as his; ▪ Designed functionalities are applied consistently.	
Details of assessments	The project group, consisting of three or four students, has a real client for the project. Each project group member is responsible for one of the Mobile Platforms to pre-program the App. Assessment moment is week 5 of the relevant teaching period. The pass mark is 55.	
Strategies and teaching activities	During the project kick-off, the students choose a client. In consultation with the client, the students deliver a design for the application to be built. During the project, students receive project guidance and support lessons.	
Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None.	

Assessment: Mobile App Development - 1915MOBL7B

Assessment objectives/criteria	The application must be functionally completed; Has the house style (brand, identity) of the client been correctly applied (style guide) in the design. If the house style has been applied in a different way within the design, the student must be able to substantiate his actions; Content (texts) can be read optimally by good alignment, attention to the line, length of the line (max. 12 words on a line), clear color contrast from text color to background color; No unnecessary white space, all parts are logically connected to each other and together form a whole; The images must fit the application and the target group. Icons or buttons must match their function and therefore clearly recognizable as the; Shaped functionalities are applied consistently. The student: ▪ Shows knowledge of platform specific features; ▪ Can design an interface based on functional requirements; ▪ Shows knowledge of the lifecycle of an app .; ▪ Can apply data binding to link data to user interface elements; ▪ Can use Swift / Java / C # to develop iOS / Android / UWP apps; ▪ Can use (secure) local storage; ▪ Can communicate with a backend server; ▪ Can integrate 3rd party libraries / code into his project; ▪ Can use market-based programming concepts in relation to (mobile) application development, including use of MVC / MVVM.
Details of assessments	The project group, consisting of three or four students, has a real client for the project. Each project group member is responsible for one of the Mobile Platforms to pre-program the App.

	Assessment moment is week 5 of the relevant teaching period. The pass mark is 55.	
Strategies and teaching activities	During the construction of the application, the students receive guidance in the form of consultations. This is scheduled 5 times 4 hours.	
Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to mandatory attendance and active participation (see also Article 27a). The game rules may vary per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None.	

Assessment: Presentation Mobile App - 1915MOBL7C

Assessment objectives/criteria	**Skills** ▪ Students demonstrate investigative and analytical skills; ▪ Students can explain used concepts, theories, models and tables; ▪ Students can motivate choices regarding content and process; ▪ Students demonstrate vision and ability to make judgments; ▪ Students can place the subject in a broader context; ▪ The presentation has added value. **Oral communication** ▪ The presentation has a clear structure (opening, core, closing); ▪ Use of aids is effective; ▪ Oral communication is provided: ▪ Well understood; ▪ Good pace; ▪ Eye contact; ▪ Energetic enthusiastic attitude and story tone; ▪ Correct and professional language use; ▪ Students demonstrate persuasion; arguments are substantiated and consistent; ▪ Students have a good interaction with the examiners.	
Details of assessments	The project group, consisting of three or four students, has a real client for the project. Each project group member is responsible for one of the Mobile Platforms to pre-program the App. Assessment moment is week 5 of the relevant teaching period.	
Strategies and teaching activities	Present workshop	
Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to mandatory attendance and active participation (see also Article 27a). The game rules may vary per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None.	

Mobile Security - 1922MOBL5Z

Content of unit of study	The students must learn about communication and security related aspects of mobile application development.
Learning outcomes	**Analyze:** ▪ 3.9 Describe security-aspects of computer systems that are linked to or via (public) networks (SW). **To advise:** ▪ 3.4 Advising on the choice of software architecture or software frameworks, in which cost aspects and quality characteristics such as availability, performance, security and scalability play a role (SW).
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: ▪ 1. The foundation year has been passed; ▪ 2. The 3rd year internship has been successfully completed;
Specific details	None.

Assessment: Paper Security - 1919MOBL5A

Assessment objectives/criteria	The student demonstrates the ability to present the technical operation, impact and solution of a vulnerability of his own choice and to describe it in a report; The student is able to hash and crack his own password with a tool; The student is able to hash and crack his own password with a tool; The student is able to reverse engineer APK and to make a list of code examples of at least 5 security leaks. **Presentations:** ▪ Students demonstrate investigative and analytical skills; ▪ Students can explain used concepts, theories, models and tables; ▪ Students can motivate choices regarding content and process; ▪ Students demonstrate vision and ability to make judgments ▪ Students can place the subject in a broader context; ▪ The presentation has added oral communication value ▪ The presentation has a clear structure (opening, core, closing); ▪ Use of aids is effective; ▪ Oral communication is provided, well understood, good pace, eye contact, energetic enthusiastic attitude and tone of voice, correct and professional use of language; ▪ Students demonstrate persuasion; arguments are substantiated and consistent; ▪ Students have a good interaction with the examiners. *All above elements are part of the grading of this course*	
Details of assessments	Written	
Strategies and teaching activities	In addition to a number of lessons that are provided by the lecturers and guest lectures, workshops have been planned that are given by specialists from ICT Security.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None.	

Assessment: Mobile Security - 1919MOBL5B

Assessment objectives/criteria	
Details of assessments	This subject is concluded with a written test that consists partly of MC questions and partly of open questions

Strategies and teaching activities	In addition to a number of lessons that are provided by the lecturers and guest lectures, workshops have been planned that are given by specialists from ICT Security.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	The student may only use pen and paper for the test.	

Electives
Security (Haarlem)

Research Security - 1916SEC01Z

Content of unit of study	During this period research is carried out within the framework of the project. Whereas in period 4.1 the emphasis was on making a research design, it is now largely about collecting and analyzing data: systematic answers are sought to sub-questions which lead to a conclusion and recommendations. This part can be considered as a focused preparation for the individual research in the graduation phase.
Learning outcomes	**6. Professionalization:** ▪ 6.3.2 Social communicative ability; ▪ 6.3.3 Creativity and problem solving skills; ▪ 6.3.4 Awareness of social responsibility. **7. Research skills:** ▪ 7.3.1 Map out the relevant aspects of a complex problem; ▪ 7.3.2 Clearly formulate the goal and research questions based on the problem analysis; ▪ 7.3.3 Make substantiated choices concerning research methods and instruments; ▪ 7.3.4 Select and use relevant, reliable and up-to-date sources to support the research; ▪ 7.3.5 Collect, analyse and interpret the relevant research data; ▪ 7.3.6 Derive substantiated conclusions and recommendations from research results. ▪ 7.3.7 Critically reflect on the research approach and the context in which it was conducted.
Requirements for participation in units of study (See also Article 29 TER)	▪ Propedeuse completed. ▪ Internship completed satisfactory.
Specific details	None.

Assessment: Research Security - 1916SEC01A

Assessment objectives/criteria	An investigation report (group product) is submitted that is assessed on: 1. Quality of the problem analysis, exploration and research questions 2. Quality of the research (methodologies, data gathering, data analysis) 3. Quality of the conclusions and recommendations 4. Quality of the reporting (text and language) 5. Quality of the evaluation and reflection (on research process and collaboration) and competency report

Details of assessments	Written thesis: based on the graduation thesis.	
Strategies and teaching activities	Lectures in which theory and processing assignments are discussed. Project consult with regard to carrying out the research and writing the paper. Peer review activities (Which are mandatory)	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids		

Penetration Testing - 1920SEC02Z

Content of unit of study	Almost daily news reaches us that the government or companies are dealing with cyber-attacks by hackers. Today's software engineering professionals must understand the basic discipline of building secure software. Not because "it's a good idea", but because the nature of the internet mandates it. This course covers penetration testing. You will learn how the target system works, the weaknesses of this system and how to practically exploit these weaknesses and hack into it.
Learning outcomes	**Analyse:** ▪ 3.9 Describe security aspects of computer systems connected to or through (public) networks (SW) ▪ 3.11 Describe security aspects of computer systems linked to or through (public) networks. (HW) **Advise:** ▪ 3.4 Advise on the choice of software architecture or software frameworks, in which cost and quality aspects such as availability, performance, security and scalability play a part. (SW)
Requirements for participation in units of study (See also Article 29 TER)	▪ Propedeuse achieved. ▪ Internship completed satisfactory.
Specific details	None.

Assessment: Final assignment - 1918SEC02A

Assessment objectives/criteria	The final assignment is to conduct a security investigation on the SBank, a website of a (fictitious) bank. This happens in two phases. During the first phase, no accounts are made available and a black box test must be performed. In the second phase, login details and source code are distributed, after which the final assignment continues as a whitebox study. The aim is to find as many vulnerabilities as possible in both phases. A vulnerability is understood to mean shortcomings that can affect the availability, integrity and / or confidentiality of the SBank. The discovered vulnerabilities, or findings, are processed in a report and presentation. For each finding it is described: how it can be reproduced, what the risk is and how it can be mitigated. In addition to the results, the report and presentation must also describe the chosen approach. The report also includes a management summary that: describes the worst findings in a non-technical way, provides an opinion on the overall security level and provides advice on how to improve the security level.	
Details of assessments	Assessment, report and presentation.	
Strategies and teaching activities	Workshops	
Compulsory attendance (See	Yes	All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on

also Article 115 TER)		Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids		

Assessment: Workshops - 1918SEC02B

Assessment objectives/criteria	▪ The student is able to use public information (osint) to target and construct social engineering attacks. ▪ The student is able to capture the flag in a vulnerable linux machine. ▪ The student is able to find as many vulnerabilities as possible in a website of a (fictitious) bank. By a vulnerability we mean shortcomings that can affect the availability, integrity and / or confidentiality of the SBank. ▪ The student is able to find as many vulnerabilities as possible in a API. By a vulnerability we mean shortcomings that can affect the availability, integrity and / or confidentiality of the API. ▪ The discovered vulnerabilities, or findings, are published in a report and presentation. For each finding it is described: how it can be reproduced, what the risk is and how it can be solved. In addition to the results, the report and presentation should also describe the chosen approach. The report also includes a management summary that: describes the worst findings in a non-technical manner, gives an opinion on the general security level and gives advice on how to improve the security level if necessary.	
Details of assessments	Researchreport and presentation .	
Strategies and teaching activities	Workshops 24 hours: ▪ 4 workshops of 6 hour ▪ Presentation of 15 minutes	
Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	N/a	

Assessment: Presentation Final assignment - 1918SEC02C

Assessment objectives/criteria	**Expertise**
	
	▪ Students demonstrate investigative and analytical skills;
	▪ Students can explain concepts, theories, models and tables used;
	▪ Students can motivate choices made with regard to content and process;
	▪ Students demonstrate vision and capacity for judgment;
	▪ Students can place the topic in a broader context;
	▪ The presentation has added value.
	
	Oral communication
	▪ The presentation has a clear structure (opening, core, closing);
	▪ Use of aids is effective;
	▪ Oral communication has been taken care of;
	  ▪ easily understandable
	  ▪ good pace

	▪ eye contact ▪ energetic enthusiastic attitude and tone of voice ▪ correct and professional use of language ▪ Students demonstrate persuasiveness; arguments are substantiated and consistent; ▪ Students interact well with the examiners.	
Details of assessments	Presentation.	
Strategies and teaching activities	24 hours: ▪ 4 workshops of 6 hour ▪ Presentation of 45 minutes.	
Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	n/a	

Network Security - 1920SEC03Z

Content of unit of study	This course provides an introduction to the core security concepts and skills needed for the installation, troubleshooting, and monitoring of network devices to maintain the integrity, confidentiality, and availability of data and devices.
Learning outcomes	**Analyse**: ▪ 2.4 Analyse infrastructure related incidents, problems and security threats. (IS) **Advise**: ▪ 2.5 Propose measures for the benefit of information security within the infrastructure. (IS) **Design**: ▪ 2.3 Set up a technical design for the use of an infrastructure, including related security measures based on functional and non-functional requirements. (IS) **Implement**: ▪ 3.3 Set up an integrated multi-level ICT environment in order to implement central monitoring of the quality and security of ICT services. (IS)
Requirements for participation in units of study (See also Article 29 TER)	▪ Propedeuse achieved. ▪ Internship completed satisfactory.
Specific details	None.

Assessment: Netwerk Security - 1916SEC03A

Assessment objectives/criteria	Upon completion of this course, students will be able to: ▪ Describe security threats facing modern network infrastructures; ▪ Secure Cisco routers and switches;

	■ Describe AAA functionalities and implement AAA on Cisco routers using local router database and server-based ACS or ISE; ■ Mitigate threats to networks using ACLs and stateful firewalls; ■ Implement IPS and IDS to secure networks against evolving attacks; ■ Mitigate threats to email, web based and endpoints attacks and common Layer 2 attacks; ■ Secure communications to ensure integrity, authenticity and confidentiality; ■ Describe the purpose of VPNs, and implement Remote Access and Site-to-Site VPNS; ■ Secure networks using ASA.
Details of assessments	Written MC test.
Strategies and teaching activities	Lecture
Compulsory attendance (See also Article 115 TER)	No
Permitted aids	Pen and scrap paper.

Assessment: Netwerk Security Practical - 1916SEC03B

Assessment objectives/criteria	Upon completion of this course, students will be able to: ■ Create a Basic Technical Security Policy; ■ Configure Basic Device Settings; ■ Configure Secure Router Administrative Access; ■ Configure a Zone-Based Policy Firewall; ■ Secure Network Switches; ■ Configure ASA Basic Settings and Firewall; ■ Configure a DMZ, Static NAT, and ACLs on an ASA; ■ Configure ASA Clientless SSL VPN Remote Access Using ASDM.
Details of assessments	Practical Skills Assignment.
Strategies and teaching activities	Workshops with skills labs.
Compulsory attendance (See also Article 115 TER)	No
Permitted aids	Student scan use internet, netacad course and powerpoint slides.

Information Security - 1916SEC04Z

Content of unit of study	The content of this module includes the material of the Exin module Information Security Foundation. (based on ISO27002) See also www.exin.nl. Companies need to secure their valuable information. This starts with informing and training employees and thereby raising awareness of the risks. The module provides insight into which measures need to be taken. It also deals with legal aspects of information security.
Learning outcomes	1. You gain knowledge about the understanding, importance and reliability of information. 2. You learn about the different types of risks, threats and damage, and about the risk strategies available and the security measures you can take. 3. You gain insight into the security policy and the organisation, including the code of conduct, ownership, incident management, roles and responsibilities.

	4. You will learn about various security measures. 1. Physical measures such as identity cards and finger scans. 2. Technical measures such as cryptography, and you learn to deal with attacks, such as phishing, spam and malware. 3. Organisational measures you can take, such as Access Management and Business Continuity Management. 5. You will be made aware of legal aspects of information security, which are important for an IT developer.
Requirements for participation in units of study (See also Article 29 TER)	Propedeuse completed. Internship completed satisfactory.
Specific details	None

Assessment: Information Security - 1916SEC04A

Assessment objectives/criteria	The student is able to understand, implement and control Information Security and Privacy guidelines.	
Details of assessments	Written MPC exam and/or Open questions	
Strategies and teaching activities	Instructional lecture.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Secure Programming - 1918SEC05Z

Content of unit of study	This course reveals the most common design and coding errors and explains how to fix each one-or better yet, avoid them from the start. This course covers all platforms, languages, and types of applications. Eliminate these security flaws from your code: SQL injection Web server- and client-related vulnerabilities Use of magic URLs, predictable cookies, and hidden form fields Buffer overruns Format string problems Integer overflows C++ catastrophes Insecure exception handling Command injection Failure to handle errors Information leakage Race conditions Poor usability Not updating easily Executing code with too much privilege Failure to protect stored data Insecure mobile code Use of weak password-based systems Weak random numbers Using cryptography incorrectly Failing to protect network traffic Improper use of PKI Trusting network name resolution.
Learning outcomes	**Analyse:** ▪ 3.9 Describe security aspects of computer systems connected to or through (public) networks (SW) ▪ 3.11 Describe security aspects of computer systems linked to or through (public) networks. (HW) **Advise:** ▪ 3.4 Advise on the choice of software architecture or software frameworks, in which cost and quality aspects such as availability, performance, security and scalability play a part. (SW)
Requirements for participation in units of study (See also Article 29 TER)	▪ Propedeuse achieved. ▪ Internship completed satisfactory.
Specific details	None.

Assessment: Secure Programming - 1918SEC05A

Assessment objectives/criteria	The student is able to analyze the following security risks: ▪ Sin 1, SQL Injection ▪ Sin 10, Command Injection ▪ Sin 12, Information Leakage ▪ Sin 5, Buffer Overruns ▪ Sin 20, Weak Random Numbers ▪ Sin 21, Using Cryptography Incorrectly ▪ Sin 24, Trusting Network Name Resolution ▪ Sin 4, Use of Magic URL's, Predictable Cookies, and Hidden Form Fields ▪ Sin 2, Web Server-Related Vulnerabilities ▪ Sin 3, Web Client-Related Vulnerabilities (XSS) ▪ Sin 9, Catching Exceptions ▪ Sin 11, Failure to Handle Errors Correctly ▪ Sin 22, Failing to Protect Network Traffic ▪ Sin 17, Failure to Protect Stored Data ▪ Sin 13, Race Conditions ▪ Sin 19, Use of Weak Password-Based Systems ▪ Sin 23, Improper Use of PKI, Especially SLL ▪ Sin 7, Integer Overflows ▪ Sin 6, Format String Problems ▪ Sin 16, Executing Code with Too Much Privilege ▪ Sin 8, C++ Catastrophes ▪ Sin 18, The Sins of Mobile Code ▪ Sin 15, Not Updating Easily ▪ Sin 14, Poor Usability	
Details of assessments	Written test and assignments.	
Strategies and teaching activities	Lecture.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None.	

Project Secure Cloud API - 1920SEC06Z

Content of unit of study	The student works with his project group to secure an cloud API. The student learns how to apply cloud application development best practices, and how to mitigate security risks.
Learning outcomes	**Design**: ▪ 2.3 Prepare a technical design for an infrastructure with associated security based on functional and non-functional requirements (IS); **Realization**: ▪ 2.2 Setting up an infrastructure that meets the requirements in the areas of performance, usability, security and compliance (IS); ▪ 3.2 Realizing public or private cloud-based infrastructure and services, taking into account all requirements (IS);
Requirements for participation in units of study (See also	▪ Propedeuse achieved. ▪ Internship completed satisfactory.

Article 29 TER) Specific details	None.

Assessment: Project Secure Cloud API - 1920SEC06A

Assessment objectives/criteria	▪ The API has been properly secured using authentication. ▪ When applicable, user roles have been defined, granting users exclusively access to resources they are authorized for. ▪ The API contains no security vulnerabilities. ▪ The API is adequately tested against security vulnerabilities. ▪ Best practices in cloud application development related to secure programming have been applied. ▪ Cloud resources are adequately protected in such a way that no secrets and/or other data is leaked through any channel (such as CI/CD pipeline, source repository, or other channels). ▪ Risks from the OWASP top 10 have been mitigated.	
Details of assessments	The work of the students will be reviewed by the examiners in a code review.	
Strategies and teaching activities	The student has the opportunity to ask questions related to the design and/or realization of the various functionalities that are relevant for the project, during the biweekly project consults.	
Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, required software.	

Term 3

Electives
Game Engineering 1 (Haarlem)

Game Programming - 1918GE004Z

Content of unit of study	The student gains insight into the functioning of a game engine and its role within the development process of a game, more particularly a multiplayer game. The student gains insight into the operation of the game engine Unity3D, through the discussion of the important aspects of game development. During the lectures, the different types of multiplayer games that exist exist, the way in which a multiplayer experience can be realized within these game types, and problems associated with different types of multiplayer games. Furthermore, on the basis of practical examples, it is illustrated how to deal with the present problems. The ultimate goal is to enable the student to independently program a multiplayer game.

Learning outcomes	**Analyze**: ▪ 3.6 Perform a requirement analysis for a software system with various stakeholders in a context of existing systems (SW); ▪ 3.7 Mapping integration and migration issues (SW). **To design**: ▪ 2.4 Preparation of a design for a software system, taking into account the use of existing components and libraries; make use of design principles and / or quality criteria (SW); ▪ 3.3 Developing a software architecture for a software system, consisting of existing and new systems, taking into account quality characteristics and stakeholders (SW). **Realize**: ▪ 3.4 Building and making available a software system that connects with existing systems, according to the designed architecture using existing frameworks (SW).
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed; 2. The 3rd year internship has been successfully completed; 3. A minimum of 130 EC has been achieved.
Specific details	

Assessment: Game Programming - 1918GE004A

Assessment objectives/criteria	The student is tested for knowledge / skills with regard to playabilty / gameplay, simple AI, scoring systems, gui and knowledge of working with Unity in a general sense. The student is expected to have thorough knowledge of the topics discussed during the lectures. He is expected to be able to make an analysis of a problem related to the course material and to propose solutions for this. Furthermore, he is expected to be able to provide a description of common problems, as well as to have formed a clear conceptual framework. When answering the exam questions, the student is expected to be able to form a well-considered opinion with regard to the subjects of this course. Cesuur: 5.5	
Details of assessments	Written exam consisting of a combination of essay questions.	
Strategies and teaching activities	Seminars	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Project Game Engineering 1 - 1922GE002Z

Content of unit of study	
Learning outcomes	
Requirements for participation in units of study (See also	

Article 29 TER)	
Specific details	

Assessment: Vertical Slice - 1918GE002C

Assessment objectives/criteria	**General**: A vertical slice is one is a part of the game that is presented to all stakeholders. A "vertical slice" is not the same as a prototype. Part of the game must be completely playable in the quality that can be expected or the game is finished. Vertical slice can be compared to a very tasty cake. But before you buy the entire cake you want to try a piece of the cake.
Details of assessments	▪ The knowledge and skills of the student are tested in a Verical Slice. ▪ Cesuur: 6.

Strategies and teaching activities	During the weekly project supervision, the student can ask questions regarding problems that arise during the design and / or implementation of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanction policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, required software	

Research Game - 1919GE003Z

Content of unit of study	The module focuses on the further development of research skills. The emphasis is on formulating good research questions, finding, assessing and using good sources and using an empirical research method to answer these questions. This module is a preparation for the graduation project in which doing research to support the final product is an important part. For this module, you write a paper together with a fellow student on a topic related to your minor. This paper is an elaboration of a well-founded research question which you will answer by means of desk research (e.g. on the basis of literature) and field research. For this paper, in addition to desk research, you base yourself on at least one other empirical research method (field research). For example, you can interview an expert or conduct a survey among your target group. You can also choose another method. Peer review is an important element in this module
Learning outcomes	**Professionalize**: 6.3.1 Self-steering ability: • Can detect, integrate and apply relevant knowledge and insights in new situations. • Takes his own task and role seriously. 6.3.2 Social communication skills: • Can work together effectively in a team; • Can give and receive feedback; • Expresses effectively in writing in correct, understandable and appropriate Dutch. 6.3.3 Creativity and problem-solving ability: • Comes up with new ideas, approaches or insights. • Comes up with different solutions to a problem. **Investigative ability**: • 7.3.1 Mapping the relevant aspects of a complex problem; • 7.3.2 Clear formulation of goal and research questions based on the problem analysis; • 7.3.3 Making substantiated choices for research methods and instruments. • 7.3.4 Selecting and using relevant, reliable and current sources to support the research; • 7.3.5 Collecting, analyzing and interpreting the relevant research data; • 7.3.6 Link substantiated conclusions and recommendations to research results.
Requirements for participation in units of study (See also	None.

Article 29 TER) Specific details	None.

Assessment: Research Game - 1919GE003A

Assessment objectives/criteria	Research is reported in the form of a paper that is assessed on: ▪ The quality of the research questions and objective ▪ The quality of desk research ▪ The quality of the field research ▪ The quality of the analysis and the conclusion ▪ The quality of reporting (language and readability) Active participation in the peer review process is required.	
Details of assessments	Written assignment: research paper on an IT subject, to be uploaded in GardeWork.	
Strategies and teaching activities	Workshops about research methods, also the research proposals of the students are discussed. Peer review Consultation with the research teacher	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Basically everything; consult the teacher in case of doubt.	

Electives
User Experience (Haarlem)

Research UX - 1919UE005Z

Content of unit of study	The module focuses on the further development of research skills. The emphasis is on formulating good research questions, finding, assessing and using good sources and using an empirical research method to answer these questions. This module is a preparation for the graduation project in which doing research to support the final product is an important part. For this module, you write a paper together with a fellow student on a topic related to your minor. This paper is an elaboration of a well-founded research question which you will answer by means of desk research (e.g. on the basis of literature) and field research. For this paper, in addition to desk research, you base yourself on at least one other empirical research method (field research). For example, you can interview an expert or conduct a survey among your target group. You can also choose another method. Peer review is an important element in this module
Learning outcomes	**Professionalize**: **6.3.1 Self-steering ability**: ▪ Can detect, integrate and apply relevant knowledge and insights in new situations. ▪ Takes his own task and role seriously. **6.3.2 Social communication skills:** ▪ Can work together effectively in a team; ▪ Can give and receive feedback; ▪ Expresses effectively in writing in correct, understandable and appropriate Dutch or English.

	6.3.3 Creativity and problem-solving ability: ▪ Comes up with new ideas, approaches or insights. ▪ Comes up with different solutions to a problem. **Investigative ability**: ▪ 7.3.1 Mapping the relevant aspects of a complex problem; ▪ 7.3.2 Clear formulation of goal and research questions based on the problem analysis; ▪ 7.3.3 Making substantiated choices for research methods and instruments. ▪ 7.3.4 Selecting and using relevant, reliable and current sources to support the research; ▪ 7.3.5 Collecting, analyzing and interpreting the relevant research data; ▪ 7.3.6 Link substantiated conclusions and recommendations to research results.
Requirements for participation in units of study (See also Article 29 TER)	None
Specific details	None

Assessment: Research UX - 1919UE005A

Assessment objectives/criteria	Research is reported in the form of a paper that is assessed on: ▪ The quality of the research questions and objective ▪ The quality of desk research ▪ The quality of the field research ▪ The quality of the analysis and the conclusion ▪ The quality of reporting (language and readability) Active participation in the peer review process is required.	
Details of assessments	Written assignment: research paper on an IT subject, to be uploaded in GardeWork.	
Strategies and teaching activities	Workshops about research methods, also the research proposals of the students are discussed. Peer review Consultation with the research teacher	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Basically everything; consult the teacher in case of doubt.	

Psychology of Interaction - 1918UE001Z

Content of unit of study	Students deepen their knowledge of underlying psychological principles that are relevant when designing user-centered, interactive systems. They apply these principles and previously acquired knowledge of HCI, UX and UCD to a project-related design problem.
Learning outcomes	**Analyze**: ▪ 2.1. Analyzing ICT and / or digital media products, target groups and objectives from an overview of current "culture" and trends for the purpose of identifying customer or user needs (GI). **Professionalize** ▪ 3.4 Awareness of social responsibility. Is aware of and supports the importance of ethics and social values for an organization.
Requirements for participation in units	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed;

of study (See also Article 29 TER)	2. The 3rd year internship has been successfully completed; 3. A minimum of 130 EC has been achieved.
Specific details	None

Assessment: Psychology of Interaction - 1918UE001A

Assessment objectives/criteria	**Psychology of Interaction** The student has insight into the psychological aspects that are important for the design of interactive systems. Possible topics that are discussed are: ergonomics and physical adjustments, memory and attention, affect, cognition and action, persuasive design, motivation, social interaction, perception and navigation and digital accessibility with regard to user centered design.	
Details of assessments	An essay on the theory covered.	
Strategies and teaching activities	Lectures and seminars.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle.
Permitted aids	None	

UX Methodologies - 1919UE002Z

Content of unit of study	The students learn the User Centered Design Methodology and train its application. The method involves Data analysis, Persona Creation, Ideation, Schript ~ Scenarios and Proto Typing.
Learning outcomes	**Analyze:** ■ 3.2 The preparation of an analysis report (target group, objective, context, information and communication needs, visualization, usability and use), and relate this to trends in ICT and / or digital media products (GI). **To advise:** ■ 3.1 Processing social and industry trends. In a recommendation for the concrete use of media and resources in the development of ICT and / or digital media products, taking into account planning and budget (GI). **Investigative ability:** ■ 3.1 Mapping the relevant aspects of a complex problem. ■ 3.2 Clear formulation of goal and research questions based on the problem analysis. ■ 3.3 Making well-founded choices of research methods and instruments. ■ 3.4 Select and use relevant, reliable and current sources to support the research. ■ 3.5 Collecting, analyzing and interpreting the relevant research data. ■ 3.6 Link substantiated conclusions and recommendations to research results. ■ 3.7 To reflect critically on the research approach and the context in which it was conducted. **Professionalize:** ■ 3.1 Self-steering ability ■ 3.2 Social communication skills ■ 3.3 Creativity and problem-solving ability.

Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed; 2. The 3rd year internship has been successfully completed; 3. A minimum of 130 EC has been achieved.
Specific details	None

Assessment: UX Methodologies - 1919UE002A

Assessment objectives/criteria	The student works all week in the UX lab on the assignment.	
Details of assessments	The student presents findings in an assessment.	
Strategies and teaching activities	The student works all week in the UX lab on the assignment.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course
Permitted aids	None.	

Workshop UX - 1920UE003Z

Content of unit of study	The students learn the User Centred Design Methodology and train its application. The methodology includes the phase: Data analysis, Persona Creation, Ideation, Script and Scenarios and Prototyping. With this methodology, the students have to define appropriate design solutions for customers.
Learning outcomes	**Analyze**: ▪ 3.2 The preparation of an analysis report (target group, objective, context, information and communication needs, visualization, usability and use), and relate this to trends in ICT and / or digital media products (GI) **To advise**: ▪ 3.1 Processing social and industry trends. In a recommendation for the concrete use of media and resources in the development of ICT and / or digital media products, taking into account planning and budget (GI) **To design**: ▪ 3.1 Designing ICT and / or digital media products from a self-designed (innovative) functionality, interaction form, style and / or service, including user experience, usability testing and innovative technology (GI) **Realize**: ▪ 3.1 Realization and testing of dynamic ICT and / or digital media products with application of innovative technologies (GI)

	Investigative ability: ■ 3.1 Mapping the relevant aspects of a complex problem. ■ 3.2 Clear formulation of goal and research questions based on the problem analysis. ■ 3.3 Making well-founded choices of research methods and instruments. ■ 3.4 Select and use relevant, reliable and current sources to support the research. ■ 3.5 Collecting, analyzing and interpreting the relevant research data. ■ 3.6 Link substantiated conclusions and recommendations to research results. ■ 3.7 To reflect critically on the research approach and the context in which it was conducted. **Professionalize**: ■ 3.1 Self-steering ability ■ 3.2 Social communication skills ■ 3.3 Creativity and problem-solving ability.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed; 2. The 3rd year internship has been successfully completed; 3. A minimum of 130 EC has been achieved.
Specific details	

Assessment: Workshop 1 - 1919UE003A

Assessment objectives/criteria	The student learns the defined UX research methodology and is able to use it: ■ Identify the problem; ■ Identify and validate the relevant requirements; ■ Document the requirements adequately; ■ Identify functional and non-functional design elements; ■ Work out a prototype.	
Details of assessments	The student presents a solution proposal in the form of a (paper) prototype in an assessment.	
Strategies and teaching activities	The students work as a group at least 75% in the UX lab on the assignment. (exceptions only allowed after consult with relevant parties). No absence allowed on mandatory elements of the course.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None	

Assessment: Workshop 2 - 1918UE003B

Assessment objectives/criteria	The student is able to use the taught methodology and: ■ Identify the problem; ■ Identify and validate the relevant requirements; ■ Document the requirements adequately; ■ Identify functional and non-functional design elements; ■ Develop a prototype. The research is clearly more in-depth than the research from workshop 1: ■ Presenting an interim report (data analysis, persona, ideation) ■ Present a final report including prototype (data analysis, persona, ideation, script and scenario, prototype/demo)

Details of assessments	The student presents according to the steps of the method: 1/ Assesment 1: Interim report (after week 1) in which research results and possible solutions are presented; 2/ Assesment 2: Final report (after week 2) with final research results and including a solution proposal in the form of a prototype and demo.	
Strategies and teaching activities	The students work as a group at least 75% in the UX lab on the assignment. (exceptions only allowed after consult with relevant parties). No absence allowed on mandatory elements of the course.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None.	

Project UX - 1920UE004Z

Content of unit of study	The students must develop a problem for an external client into a suitable design solution.
Learning outcomes	**Analyze**: ■ 3.2 The preparation of an analysis report (target group, objective, context, information and communication needs, visualization, usability and use), and relate this to trends in ICT and / or digital media products (GI) **To advise**: ■ 3.1 Processing social and industry trends. In a recommendation for the concrete use of media and resources in the development of ICT and / or digital media products, taking into account planning and budget (GI) **To design**: ■ 3.1 Designing ICT and / or digital media products from a self-designed (innovative) functionality, interaction form, style and / or service, including user experience, usability testing and innovative technology (GI) **Realize**: ■ 3.1 Realization and testing of dynamic ICT and / or digital media products with application of innovative technologies (GI) **Investigative ability**: ■ 3.1 Mapping the relevant aspects of a complex problem. ■ 3.2 Clear formulation of goal and research questions based on the problem analysis. ■ 3.3 Making well-founded choices of research methods and instruments. ■ 3.4 Select and use relevant, reliable and current sources to support the research. ■ 3.5 Collecting, analyzing and interpreting the relevant research data.

	■ 3.6 Link substantiated conclusions and recommendations to research results. ■ 3.7 To reflect critically on the research approach and the context in which it was conducted. **Professionalize**: ■ 3.1 Self-steering ability ■ 3.2 Social communication skills ■ 3.3 Creativity and problem-solving ability.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: 1. The foundation year has been passed; 2. The 3rd year internship has been successfully completed; 3. A minimum of 130 EC has been achieved .
Specific details	

Assessment: Alpha - 1918UE004A

Assessment objectives/criteria	The student presents in an Alpha presentation: **1. Research and Data Analysis** ■ Quality of the data analysis (Did the group have a clear picture of the problems outlined by your client?) ■ Is there additional research regarding the problem? (to what extent does the group validate or strengthen the input provided by the client through its own research? ■ To what extent does the group clarify the core problem of the issue (Linking the data, main questions and sub-questions). **2. Experience Mapping** ■ A clear experience map has been created in which stages and tasks are described that are relevant for clarifying the problem. (Stages can be eg before, during or after a task or tasks) ■ Is there a logical relationship between the Data analysis, Main and / or sub-questions and the Experience map? ■ 'Pain Points' and 'Goals' have been identified and are substantiated. **3. Personas** ■ The personas are a clear representation of the target group and / or user population. ■ The personas have relevant 'attributes', 'goals', 'concerns' and a 'quote' ■ The personas are sufficiently distinctive in their definition to base different design decisions on. **7. Presentation (Alpha)** ■ In the presentation, the main question and the sub-questions from the research are treated and clearly answered based on evidence from research or testing. ■ The presentation is aimed at the client and teachers and offers, with substantiation, a suitable solution for the questions asked. **8.Dossier/Log** ■ This log (physically or digitally) offers a good insight in the process the group went through for the Alpha presentation of their project. The file is up-to-date and well-structured. All processes, findings and decisions regarding points 1,2 3 and 6 are addressed.	
Details of assessments	Alpha presentation.	
Strategies and teaching activities	Course developed as Living Lab (off-line). Attendance is compulsory. The student works the whole week on the assignment (partly independently). (exceptions only allowed after consult with relevant parties). No absence allowed on mandatory elements of the course.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the

		project manual and the relevant Moodle Course.
Permitted aids	None.	

Assessment: Beta - 1918UE004B

Assessment objectives/criteria	The student presents in the Beta presentation: **1. Data Analysis (Reinforced analysis compared to Alpha/90% final)** ▪ Quality of the data analysis (Did the group have a clear picture of the problems outlined by your client?) ▪ Is there additional research regarding the problem? (to what extent does the group validate or strengthen the input provided by the client through its own research? ▪ To what extent does the group clarify the core problem of the issue (Linking the data, main questions and sub-questions). **2. Experience Mapping (Reinforced analysis compared to Alpha/90% final)** ▪ A clear experience map has been created in which stages and tasks are described that are relevant for clarifying the problem. (Stages can be eg before, during or after a task or tasks) ▪ Is there a logical relationship between the data analysis, Main and / or sub-questions and the experience map? ▪ 'Pain Points' and 'Goals' have been identified and are substantiated. **3. Personas (Reinforced analysis compared to Alpha/90% final** ▪ The personas are a clear representation of the target group and / or user population. ▪ The personas have relevant 'attributes', 'goals', 'concerns' and a 'quote' ▪ The personas are sufficiently distinctive in their definition to base different design decisions on. **4. Ideation (First draft)** ▪ The ideation process surrounding the assignment is clearly communicated (it is clear which approach the group has chosen) ▪ Different ideas regarding (partial) solutions are clearly communicated (in image and / or text) ▪ Pros and cons design directions are clearly communicated. **5. Script & Scenarios (First draft)** ▪ Scripts and / or scenarios are relevant tasks and / or objective based on the personas created. The scripts and scenarios fit within the answer to the main and sub questions of the problem. ▪ The scripts and scenarios have been tested and the results of that test (or the adjustments) are communicated, ▪ Scripts and / or scenarios are convincing in the sense that they are realistic and fit within the answers to the main and / or sub-questions. **6. Prototype / PoC (First draft)** ▪ The PoC is a clear addition to answering the principal and / or partial questions of the client. ▪ The flow (s) of the PoC is / are clear support for the scripts and / or scenarios outlined. ▪ The interface and feedback from the PoC clearly fit in with the outlined tasks of the user population. **7. Presentation (Beta)** ▪ In the final presentation, the main question and the sub-questions from the research are treated and clearly answered based on evidence from research or testing. ▪ The presentation is aimed at the client and, with substantiation, offers a suitable solution for the questions asked. **8. Dossier/Log** ▪ This log (physically or digitally) offers a good insight in the process the group went through for the Beta presentation of their project. The file is up-to-date and well-structured. All processes, findings and decisions regarding points 1,2,3,4,5,6 and 7 are addressed.	
Details of assessments	Beta presentation	
Strategies and teaching activities	Course developed as Living Lab (off-line). Attendance is compulsory. The student works the whole week on the assignment (partly independently). (exceptions only allowed after consult with relevant parties). No absence allowed on mandatory elements of the course.	
Compulsory attendance (See	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle.

also Article 115 TER)		Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None	

Assessment: Release Candidate - 1918UE004C

Assessment objectives/criteria	The student presents in the Release Candidate presentation: **4. Ideation (Second draft)(Strengthened analysis compared to Beta / 90% final** ▪ The ideation process surrounding the assignment is clearly communicated (it is clear which approach the group has chosen) ▪ Different ideas regarding (partial) solutions are clearly communicated (in image and / or text) ▪ Pros and cons design directions are clearly communicated. **5. Script & Scenarios (Second draft)(Strengthened analysis compared to Beta / 90% final)** ▪ Scripts and / or scenarios are relevant tasks and / or objective based on the personas created. The scripts and scenarios fit within the answer to the main and sub questions of the problem. ▪ The scripts and scenarios have been tested and the results of that test (or the adjustments) are communicated, ▪ Scripts and / or scenarios are convincing in the sense that they are realistic and fit within the answers to the main and / or sub-questions. **6. Prototype / PoC (Second draft)(Strengthened analysis compared to Beta / 90% final)** ▪ The PoC is a clear addition to answering the principal and / or partial questions of the client. ▪ The flow (s) of the PoC is / are clear support for the scripts and / or scenarios outlined. ▪ The interface and feedback from the PoC clearly fit in with the outlined tasks of the user population. **7. Presentation (Release Candidate)** ▪ In the final presentation, the main question and the sub-questions from the research are treated and clearly answered based on evidence from research or testing. ▪ The presentation is aimed at the client and, with substantiation, offers a suitable solution for the questions asked. **8.Dossier/Log** ▪ This log (physically or digitally) offers a good insight in the process the group went through for the Release Candidate presentation of their project. The file is up-to-date and well-structured. All processes, findings and decisions regarding points 4,5,6 and 7 are addressed.	
Details of assessments	Release Candidate presentation.	
Strategies and teaching activities	Course developed as Living Lab (off-line). Attendance is compulsory. The student works the whole week on the assignment (partly independently). (exceptions only allowed after consult with relevant parties). No absence allowed on mandatory elements of the course.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None	

Assessment: Gold Master - 1918UE004D

Assessment objectives/criteria	The student presents in the Gold Master presentation: (All elements 100% final)

	1. The main and sub-question (original or revised) ▪ First, we like to know the main and sub-question (original or revised) that were the bases for the solution your team came up with. **2. The 'highlights' of your research and your experience mapping (original or revised)** ▪ We would like to hear the 'highlights' of your research and your experience mapping. (Methods and particulars that gave you the relevant data to work with) **3. Personas (original or revised)** ▪ We would like you to present your personas, particular the goals and paint points you trying to resolve for them. **4. Ideation (Finalized)** ▪ We would like an insight in your ideation process. What were initial ideas you came up with to remedy a particular issue? How did this idea develop over time? In what way did it end up in your proposed solution? **5. Prototype / PoC with relevant Script & Scenarios (Finalized)** ▪ And of course, we want to see the final product! Take us through a couple of good scenarios to show the relevance of your product for the client's issues. Be smart and focus in your demo, first of all, on key functionality. Better to show three good ones that 6 half-baked. Prove your case before us that your product is a good vehicle for your client to build upon. **8. Dossier/Log (Finalized)** ▪ This log (physically or digitally) offers a good insight in the process the group went through for the Release Candidate presentation of their project. The file is up-to-date and well-structured. All processes, findings and decisions regarding points 4,5,6 and 7 are addressed.	
Details of assessments	Gold Master presentation .	
Strategies and teaching activities	Course developed as Living Lab (off-line). Attendance is compulsory. The student works the whole week on the assignment (partly independently). (exceptions only allowed after consult with relevant parties). No absence allowed on mandatory elements of the course.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	None.	

Term 4

Electives
Big Data & AI 2 (Haarlem)

Project Big Data & AI: PoC - 1922BDPOCZ

Content of unit of study	During the Big Data & AI semester, the students work in groups on four on a Big Data & AI project. The semester consists of two terms. This (Project Big Data & AI – PoC) is the project of the second term. Every week there is project supervision in which a teacher monitors the planning, the progress and the group process. The students can also ask technical questions about the project during this supervision. Students come up with a SOLUTION for the 'data science / computer vision / speech analysis' project.
Learning outcomes	Analyze ▪ 3.3. Make a quantitative and / or qualitative analysis of the current and future situation in the field of, for example, policy, strategy, alignment and architecture, using common methods (BP); ▪ 3.8. Analyzing Big Data and describing cause-effect relationships (IS); ▪ 3.12. The preparation of an analysis report (target group, objective, context, information and communication needs, visualization, usability and use), and relate this to trends in ICT and / or digital media products (BP). To advise: ▪ 3.6. Advising on internal and external alignment between business and IT (alignment and governance) based on the (network) organization strategy and objectives (BP). Realize: ▪ 2.3. Building and making available a software system that consists of several subsystems, making use of existing components (SW). Professionalize: ▪ 3.1 Self-steering ability; ▪ 3.2 Social communication skills; ▪ 3.3 Creativity and problem-solving ability; ▪ 3.4 Awareness of social responsibility. Investigative ability: ▪ 3.1 Mapping the relevant aspects of a complex problem; ▪ 3.2 Clear formulation of goal and research questions based on the problem analysis; ▪ 3.5 Collecting, analyzing and interpreting the relevant research data; ▪ 3.6 Link substantiated conclusions and recommendations to research results
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None

Assessment: Proof of Concept Application - 1922BDPOCA

Assessment objectives/criteria	The student is able to: ▪ Discovering, demonstrating and predicting cause-effect changes from a large collection of data (Big Data) using artificial intelligence techniques. ▪ The student can present this in a presentation to the client, also makes a proof-of-concept application to validate the research and describes his findings in an advice report.	
Details of assessments	*Other method (A) / assessment* The student deliveres the folllowing products in preparation for the next term: ▪ D. Proof of Concept Application (50%); *The proof-of-concept application or script makes use of the initial cleaned/prepared dataset, the previously trained model, constructed/realized based on the previous TFGD to demonstrate the workings of the algortithm/model. The proof-of-concept application needs to adhere to the minimum requirements of the client company.*	
Strategies and teaching activities	16 Contacthours: Project support / consultancy + Unaccompanied project hours	
Compulsory attendance (See also Article 115	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction

TER)		the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, internet, VMware Image.	

Assessment: Advice Report / Publication - 1922BDPOCB

Assessment objectives/criteria	The student is able to: ■ Discovering, demonstrating and predicting cause-effect changes from a large collection of data (Big Data) using artificial intelligence techniques. ■ The student can present this in a presentation to the client, also makes a proof-of-concept application to validate the research and describes his findings in an advice report.	
Details of assessments	*Other method (A) / assessment* The student delivers the folllowing products: ■ E. Advice Report/Publication (50%); *The Advice Report consists of: a List of terms and abbreviations, Summary (max 1 A4), Introduction with research question and sub-questions, Project assignment, Project/research approach, Research findings, Conclusion and recommendations, Literature and source list, Cover page, table of contents, correct use of language and neat layout, and a list of APA references used in a correct manner.* *The Advice Report can be replaced by a publication/article in a peer-reviewed scientific journal. The article needs to be accepted for publication and adheres to the authoring guidelines of the specific journal.*	
Strategies and teaching activities	16 Contacthours: Project support / consultancy + Unaccompanied project hours	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, internet, VMware Image.	

Parallel Distributed Processing - 1922PARDPZ

Content of unit of study	The student is able to: ■ Use Hadoop ecosystem and techniques to process distributed data/algorithms in a parallel manner using multiple nodes in a cluster; During this PDP / Hadoop Fundamentals course, the student learns how to use a number of practical tools for Big Data. Hadoop MapReduce, Pig, Hive and Spark, among others, are covered in online courses. The student can apply the acquired skills in the three assignments that are assessed with a mark.
Learning outcomes	Analyze: ■ 3.8 Analyzing Big Data and describing cause-effect relationships (IS). Realize: ■ 3.4 Building and making available a software system that matches existing systems, according to the designed architecture using existing frameworks (SW).

	Investigative capacity: ▪ 3.5 -Collect, analyze and interpret the research data
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None.

Assessment: Parallel Distributed Processing - 1922PARDPA

Assessment objectives/criteria	The student is able to: ▪ Develop an application by using Hadoop MapReduce; ▪ Develop an application by using Pig / Hive; ▪ Develop an application by using Apache Spark	
Details of assessments	*Other method (A) / assessment* Series of assignments	
Strategies and teaching activities	24 Contacthours: Lectures and seminars	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, internet, VMware Image	

Computer Vision 2 - 1922CVIS2Z

Content of unit of study	The student is able to: ▪ Analyze image or video data using a computer vision model, library or technique;
Learning outcomes	Realize: ▪ 3.4. Building and making available a software system that connects with existing systems, according to the designed architecture using existing frameworks (SW) Investigative ability: ▪ 3.2 Clear formulation of goal and research questions based on the problem analysis; ▪ 3.5 Collecting, analyzing and interpreting the relevant research data;
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None.

Assessment: Computer Vision 2 - 1922CVIS2A

Assessment objectives/criteria	The student can demonstrate and apply the knowledge and skills in the field of Computer Vision on an advanced level (object recognition and motion detection).
Details of	*Exam without written session (SZ)*

assessments	All skills and knowledge will be tested during a series of smaller assignments	
Strategies and teaching activities	16 Contacthours: Lectures and guest lectures	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC (own laptop), internet, (computer vision) software, papers.	

Natural Language Processing - 1922NLNGPZ

Content of unit of study	The student is able to: ▪ Analyze speech, audio or text using a NLP model, library or technique;
Learning outcomes	Realize: ▪ 3.4. Building and making available a software system that connects with existing systems, according to the designed architecture using existing frameworks (SW) Investigative ability: ▪ 3.2 Clear formulation of goal and research questions based on the problem analysis; ▪ 3.5 Collecting, analyzing and interpreting the relevant research data;
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None.

Assessment: Natural Language Processing - 1922NLNGPA

Assessment objectives/criteria	The student can demonstrate and apply the knowledge and skills in the field of Natural Language Processing on a basic level (detection and recognition of speech / audio [speech-to-text] AND text-analysis).	
Details of assessments	*Exam without written session (SZ)* All skills and knowledge will be tested during a final assignment.	
Strategies and teaching activities	16 Contacthours: Lectures and guest lectures	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC (own laptop), internet, (NLP / speech / audio) software, papers.	

Capita Selecta - 1922CAPSLZ

Content of unit of	The student is able to:

study	▪ Analyze the scientific status quo [current status in the field] of data science and AI; ▪ Reproduce interesting findings of guest speakers; ▪ Formulate good / best practices based on scientific insights;
Learning outcomes	Analyze: ▪ 3.3. Make a quantitative and / or qualitative analysis of the current and future situation in the field of, for example, policy, strategy, alignment and architecture, using common methods (BP);
Requirements for participation in units of study (See also Article 29 TER)	Condition for participation in optional education: Propedeuse (propedeutic exam) achieved. Vocational training internship with a satisfactory completion.
Specific details	None

Assessment: Capita Selecta - 1922CAPSLA

Assessment objectives/criteria	The student can demonstrate and apply the knowledge and skills that were obtained during guest lectures (masterclasses).	
Details of assessments	*Other method (A) / assessment* A small paper on the insights of the (guest) masterclasses of several data science companies.	
Strategies and teaching activities	8 Contacthours: (Guest) Lectures / Masterclasses	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, internet, papers.	

Professional Presenting - 1916GE011Z

Content of unit of study	For research during optional education, the student carries out a research into an IT Trend in a team context. The team provides a presentation to fellow students about this trend, making use of multiple interactive and didactic teaching methods. To prepare this presentation, each team writes a plan describing the objectives, work forms and planning of the implementation of the presentation. The presentation itself is assessed according to fixed criteria and forms the test of this course.
Learning outcomes	**Professionalisation** **6.3.1 Self-management skills** ▪ Recognises areas where he/she could do better and formulates learning objectives based on feedback and self-reflection; ▪ Takes his/her task and role seriously. **6.3.2 Social-communicative ability** ▪ Can pass on knowledge, insights and skills to others; ▪ Can give and receive feedback; ▪ Can express him/herself effectively both orally and in writing, using correct, comprehensible and appropriate language; ▪ Can report on the results achieved and the process. **6.3.3 Creativity and problem-solving skills** ▪ Comes up with new ideas, approaches or insights; ▪ Presents in a professional way using interactive and didactic techniques and skills. **Research skills**

	■ 3.1. can identify the relevant aspects of a complex problem; ■ 3.2. can formulate an objective and research questions clearly based on the problem analysis.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start electives, the following entry requirements must have been met: ■ The first year of the programme must have been completed successfully. ■ The Year 3 work placement must have been completed successfully. ■ A minimum of 130 ECTS credits must have been obtained.
Specific details	None

Assessment: Professional Presenting - 1915GE011A

Assessment objectives/criteria	**Presenting test criteria professionally** ■ The student can convey knowledge, insights and skills to others, based to knowledge level and interest of the target group; ■ The student can convey research results to peers in the form of a professional, interactive presentation using a wide range of teaching methods and presentation techniques. To prepare for this, the student will define objectives and produce a plan in which the presentation is planned and structured. ■ The student can formulate objectives for the transfer of knowledge and skills, select the teaching methods that are most appropriate for doing so and incorporate them in a *plan* <u>The lesson delivered will be assessed based on the following criteria:</u> ■ Objective: is it clear what the students want to achieve through the presentation? ■ Initial scenario: do the students explore the initial scenario and respond to it adequately? ■ Content: is the material delivered in a structured way and in a manageable quantity? ■ Work form (s): Does the work form used match the objective and is it being implemented properly? ■ Teaching method(s): is the teaching method used in line with the objective and is it implemented effectively? ■ Learning resources: are the learning resources used in line with the objective and are they used effectively? (PowerPoint, Moodle, …) ■ Wrap-up: do the students wrap the presentation up effectively? Do they come back to the objective? Do they review the situation? ■ Presentation skills: how do they use voice, speaking rate, posture, eye contact? ■ Interaction: Do they actively make use of interaction with their audience?	
Details of assessments	The students prepare a plan based on the test criteria. The presentation is based on the plan. The presentation is evaluated and assessed by students and teachers present. <u>Presenting research professionally</u> Planning and providing a lesson about the current IT trend chosen. The lesson plan is a conditional requirement. Teaching in accordance with requirements (assessment form, see test criteria).	
Strategies and teaching activities	Two lectures, a consultancy and feedback meeting and a workshop/presentation to be executed by the students. In professional presentation skills, a workshop is prepared and presented in groups on the ICT topic chosen in research paper. Two lectures and a feedback moment are planned for this. In addition, two presentations/workshops from fellow students are visited.	
Compulsory attendance (See also Article 115 TER)	Yes	Yes for the seminars
Permitted aids	Teaching material, teaching aids.	

Project Game Engineering 2 - 1922GE007Z

Content of unit of study	The student is able to develop a multiplayer game in a structured way on the basis of his acquired knowledge in the educational units Game Engine, Multiplayer Game, Game Design, Scrum and Business of Gaming that is based on one or more eligible fields of view (creativity originality, commercial viability) can be successful.
Learning outcomes	**Analyze**: ■ 3.2. Preparation of an analysis report (target group, objective, context, information and communication needs, visualization, usability and use), and relate this to trends in ICT and / or digital media products (GI); ■ 3.6. Perform a requirement analysis for a software system with different stakeholders in a context of existing systems (SW). **To advise:** ■ 2.3. Advising on new opportunities for the organization based on developments in ICT (BP); ■ 3.1. Processing social and industry trends In a recommendation for the concrete use of media and resources in the development of ICT and / or digital media products, taking into account planning and budget; ■ 3.4. Advising on the choice of software architecture or software frameworks, in which cost aspects and quality characteristics such as availability, performance, security and scalability play a role (SW). **To design:** ■ 2.5. Determining the quality of the design, for example by testing or prototyping, taking into account the formulated quality properties (SW); ■ 2.6. Prepare test designs according to a given test strategy (SW); ■ 3.1. Designing ICT and / or digital media products from a self-designed (innovative) functionality, interaction form, style and / or service, including user experience, usability testing and innovative technology (GI); ■ 3.3. Developing a software architecture for a software system, consisting of existing and new systems, taking into account quality characteristics and stakeholders (SW). **Realize**: ■ 3.1. Realization and testing of dynamic ICT and / or digital media products with the application of innovative technologies (GI); ■ 3.4. Building and making available a software system that connects with existing systems, according to the designed architecture using existing frameworks (SW). **Investigative ability**: ■ 3.1 Mapping the relevant aspects of a complex problem. ■ 3.3 Making substantiated choices of research methods and instruments. ■ 3.4 Selecting and using relevant, reliable and current sources to support the research. ■ 3.5 Collecting, analyzing and interpreting the relevant research data. ■ 3.6 Link substantiated conclusions and recommendations to research results.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start elective education, the following admission requirements apply: ■ The foundation year has been passed; ■ The 3rd year of internship has been successfully completed

Specific details	None.

Assessment: Goldmaster - 1917GE007A

Assessment objectives/criteria	**General**: ■ The games are now ready to be distributed. For this, the store forms must be filled in and / or installers prepared for submission (depending on platform); ■ Deliver updated "Game design document" in google docs.	
Details of assessments	The knowledge and skills of the student are tested with goldmaster. Cesuur: 6	
Strategies and teaching activities	During the weekly project supervision, the student can ask questions regarding problems that arise during the design and / or implementation of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanction policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	PC, required software	

Assessment: Code Assessment - 1917GE007E

Assessment objectives/criteria	▪ The student can demonstrate that he has made a relevant contribution to the project by indicating which parts he has developed himself. ▪ Student The student can demonstrate that he has actually developed the above-mentioned parts himself by explaining how they work and answering questions about them; ▪ The student can explain and substantiate how he came to the choice of certain programming solutions; ▪ The student can explain how the code developed by him interacts with other parts of the program; ▪ The student can explain the operation of the following components in programs, regardless of whether he has developed them himself: base class, derived classes, inheritance, properties, access modifiers; ▪ The student can add clear comments where it makes sense to comment on code; ▪ The student can give examples of programming solutions that have been the subject of discussion within the team, and broadly state what the considerations and / or problems were; ▪ The student can conform to an agreed coding standard.
Details of	Individual assessment.

assessments	During the assessment, the student demonstrates his / her developed part of the application and answers questions about it. Cesuur: 6.	
Strategies and teaching activities	During the weekly project supervision, the student can ask questions regarding problems that arise during the design and / or implementation of various functionalities that are relevant to his project.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation apply to all projects (see also Article 27a). The rules may differ per project and are published on Moodle. Insufficient cooperation or opposing in group work can lead to a sanction. With the first sanction the student receives a warning, with the second sanction a yellow card and a third sanction results in disqualification from the project group (red card). For a more detailed interpretation of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids		

Mathematics - 1913GE006Z

Content of unit of study	"Mathematics theory" deals with various topics from discrete mathematics, such as recurring relations, graph theory. In addition, various algorithms and systems are treated, including Shortest Path, Minimum Spanning Tree, Huffman coding and Markov chain. At " Mathematics practical", students receive programming assignments that incorporate the topics of "Mathematics theory". With the help of an application to be developed, mathematical problems are solved, whereby different data structures are applied.
Learning outcomes	**Analyze**: ▪ 2.6 - Analyzing and solving a mathematical problem. **Realize**: ▪ 2.3 - Building and making available a software system that consists of several subsystems, making use of existing components (SW).
Requirements for participation in units of study (See also Article 29 TER)	None.
Specific details	None.

Assessment: Mathematics theory - 1913GE006A

Assessment objectives/criteria	The student can: ▪ can determine, resolve and simplify recurring relationships; ▪ knows concepts from graph theory; ▪ can describe and apply the operation of different algorithms and systems (Dijkstra, Minimum Spanning Tree, Huffman coding, Markov chain).
Details of assessments	A written test.
Strategies and teaching activities	The subject of the week in question is discussed in class. During the lesson, students receive a number of short assignments that are first worked out individually and then discussed in class.

Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Assessment: Mathematics practical - 1913GE006B

Assessment objectives/criteria	The student can solve various mathematical problems that are consistent with "Mathematics theory". The following topics are covered in the assignments: ▪ Recurring relations; ▪ Markov chain; ▪ Huffman coding; ▪ "Minimum Spanning Tree" algorithms; ▪ "Shortest Path" algorithms.	
Details of assessments	The module is tested by weekly practical assignments that tie in with mathematics theory. Students must complete the assignments given in C # with Visual Studio. The student must be able to explain the operation during the assessment	
Strategies and teaching activities	The practical lesson starts with a (classroom) explanation of the assignment, after which the students can get started. During the lesson, the assignment of the previous week is assessed. Because the lessons are given every other week, the students have 2 weeks for each assignment. The student is expected to work out the weekly assignments independently.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	PC, required software, dictation and internet.	

Professional Presenting - 1916GE011Z

Content of unit of study	For research during optional education, the student carries out a research into an IT Trend in a team context. The team provides a presentation to fellow students about this trend, making use of multiple interactive and didactic teaching methods. To prepare this presentation, each team writes a plan describing the objectives, work forms and planning of the implementation of the presentation. The presentation itself is assessed according to fixed criteria and forms the test of this course.
Learning outcomes	**Professionalisation** **6.3.1 Self-management skills** ▪ Recognises areas where he/she could do better and formulates learning objectives based on feedback and self-reflection; ▪ Takes his/her task and role seriously. **6.3.2 Social-communicative ability** ▪ Can pass on knowledge, insights and skills to others; ▪ Can give and receive feedback; ▪ Can express him/herself effectively both orally and in writing, using correct, comprehensible and appropriate language; ▪ Can report on the results achieved and the process. **6.3.3 Creativity and problem-solving skills** ▪ Comes up with new ideas, approaches or insights; ▪ Presents in a professional way using interactive and didactic techniques and skills. **Research skills** ▪ 3.1. can identify the relevant aspects of a complex problem;

	▪ 3.2. can formulate an objective and research questions clearly based on the problem analysis.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start electives, the following entry requirements must have been met: ▪ The first year of the programme must have been completed successfully. ▪ The Year 3 work placement must have been completed successfully. ▪ A minimum of 130 ECTS credits must have been obtained.
Specific details	None

Assessment: Professional Presenting - 1915GE011A

Assessment objectives/criteria	**Presenting test criteria professionally** ▪ The student can convey knowledge, insights and skills to others, based to knowledge level and interest of the target group; ▪ The student can convey research results to peers in the form of a professional, interactive presentation using a wide range of teaching methods and presentation techniques. To prepare for this, the student will define objectives and produce a plan in which the presentation is planned and structured. ▪ The student can formulate objectives for the transfer of knowledge and skills, select the teaching methods that are most appropriate for doing so and incorporate them in a *plan* <u>The lesson delivered will be assessed based on the following criteria:</u> ▪ Objective: is it clear what the students want to achieve through the presentation? ▪ Initial scenario: do the students explore the initial scenario and respond to it adequately? ▪ Content: is the material delivered in a structured way and in a manageable quantity? ▪ Work form (s): Does the work form used match the objective and is it being implemented properly? ▪ Teaching method(s): is the teaching method used in line with the objective and is it implemented effectively? ▪ Learning resources: are the learning resources used in line with the objective and are they used effectively? (PowerPoint, Moodle, …) ▪ Wrap-up: do the students wrap the presentation up effectively? Do they come back to the objective? Do they review the situation? ▪ Presentation skills: how do they use voice, speaking rate, posture, eye contact? ▪ Interaction: Do they actively make use of interaction with their audience?	
Details of assessments	The students prepare a plan based on the test criteria. The presentation is based on the plan. The presentation is evaluated and assessed by students and teachers present. <u>Presenting research professionally</u> Planning and providing a lesson about the current IT trend chosen. The lesson plan is a conditional requirement. Teaching in accordance with requirements (assessment form, see test criteria).	
Strategies and teaching activities	Two lectures, a consultancy and feedback meeting and a workshop/presentation to be executed by the students. In professional presentation skills, a workshop is prepared and presented in groups on the ICT topic chosen in research paper. Two lectures and a feedback moment are planned for this. In addition, two presentations/workshops from fellow students are visited.	
Compulsory attendance (See also Article 115 TER)	Yes	Yes for the seminars
Permitted aids	Teaching material, teaching aids.	

Penetration Testing - 1922SEC02Z

Content of unit of study	Almost daily news reaches us that the government or companies are dealing with cyber-attacks by hackers. Today's software engineering professionals must understand the basic discipline of building secure software. Not because "it's a good idea", but because the nature of the internet mandates it. This course covers penetration testing. You will learn how the target system works, the weaknesses of this system and how to practically exploit these weaknesses and hack into it.
Learning outcomes	**Analyze**: ▪ 3.9. Describe security aspects of computer systems that are linked to or via (public) networks (SW); ▪ 3.11. Describe security aspects of computer systems that are linked to or via (public) networks (HW). **Advise**: ▪ 3.4. Advising on the choice of software architecture or software frameworks, in which cost aspects and quality characteristics such as availability, performance, security and scalability play a role (SW).
Requirements for participation in units of study (See also Article 29 TER)	☐ Propedeuse achieved. ☐ Vocational internship with a pass
Specific details	

Assessment: Final assignment - 1922SEC02A

Assessment objectives/criteria	This final report follows the same format as the sbank assignment. The discovered vulnerabilities, or findings, are published in a report and presentation. For each finding it is described: how it can be reproduced, what the risk is and how it can be solved. In cases where a specific vulnerability is absent: explain why the code is secure. In addition to the results, the report and presentation should describe the chosen approach. The report also includes a management summary that: describes the worst findings in a non-technical manner, gives an opinion on the general security level and gives advice on how to improve the security level if necessary. Present your findings in a technical report in the following format (English or Dutch): **Management summary** 1. Introduction; 2. Approach and scope. The technical specifics of the test: what will be tested and what not? ▪ Findings For each topic: 1. The vulnerability and risk; 2. How to exploit; 3. Remediation; 4. Conclusion. A general conclusion on the overall security level of the API. The final report and presentation will be graded based on the quality of the findings and the quality of reporting. Presentation attendance is mandatory for passing this assignment.

Details of assessments	Assessmentreport and presentation.	
Strategies and teaching activities	Workshops 24 hours: ▪ 4 workshops of 6 hour ▪ Presentation of 45 minutes.	
Compulsory attendance (See also Article 115 TER)	Yes	Mandatory attendance and active participation applies to all projects (see also article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. With the first sanction the student will receive a warning, with the second sanction a yellow card and a third sanction will result in disqualification from the project group (red card). For further details of the sanctions policy, please refer to the project manual and the relevant Moodle Course.
Permitted aids	n/a	

Assessment: Workshops - 1918SEC02B

Assessment objectives/criteria	▪ The student is able to use public information (osint) to target and construct social engineering attacks. ▪ The student is able to capture the flag in a vulnerable linux machine. ▪ The student is able to find as many vulnerabilities as possible in a website of a (fictitious) bank. By a vulnerability we mean shortcomings that can affect the availability, integrity and / or confidentiality of the SBank. ▪ The student is able to find as many vulnerabilities as possible in a API. By a vulnerability we mean shortcomings that can affect the availability, integrity and / or confidentiality of the API. ▪ The discovered vulnerabilities, or findings, are published in a report and presentation. For each finding it is described: how it can be reproduced, what the risk is and how it can be solved. In addition to the results, the report and presentation should also describe the chosen approach. The report also includes a management summary that: describes the worst findings in a non-technical manner, gives an opinion on the general security level and gives advice on how to improve the security level if necessary.
Details of assessments	Researchreport and presentation .
Strategies and teaching activities	Workshops 24 hours: ▪ 4 workshops of 6 hour ▪ Presentation of 15 minutes

Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	N/a	

Assessment: Presentation Final assignment - 1918SEC02C

Assessment objectives/criteria	**Expertise** ▪ Students demonstrate investigative and analytical skills; ▪ Students can explain concepts, theories, models and tables used;

	▪ Students can motivate choices made with regard to content and process;
	▪ Students demonstrate vision and capacity for judgment;
	▪ Students can place the topic in a broader context;
	▪ The presentation has added value.
	
	Oral communication
	▪ The presentation has a clear structure (opening, core, closing);
	▪ Use of aids is effective;
	▪ Oral communication has been taken care of;
	  ▪ easily understandable
	  ▪ good pace
	  ▪ eye contact
	  ▪ energetic enthusiastic attitude and tone of voice
	  ▪ correct and professional use of language
	▪ Students demonstrate persuasiveness; arguments are substantiated and consistent;
	▪ Students interact well with the examiners.	

Details of assessments	Presentation.	
Strategies and teaching activities	24 hours: ▪ 4 workshops of 6 hour ▪ Presentation of 45 minutes.	
Compulsory attendance (See also Article 115 TER)	Yes	All projects are subject to compulsory attendance and active participation (see also Article 27a). The rules of the game may differ per project and are published on Moodle. Insufficient cooperation or opposition in group work can lead to a sanction. The student receives a warning with the first sanction, a yellow card with the second sanction and a third sanction results in disqualification from the project group (red card). For further details of the sanctions policy, reference is made to the project manual and the relevant Moodle Course.
Permitted aids	n/a	

Network Security - 1920SEC03Z

Content of unit of study	This course provides an introduction to the core security concepts and skills needed for the installation, troubleshooting, and monitoring of network devices to maintain the integrity, confidentiality, and availability of data and devices.
Learning outcomes	**Analyse**: ▪ 2.4 Analyse infrastructure related incidents, problems and security threats. (IS) **Advise**: ▪ 2.5 Propose measures for the benefit of information security within the infrastructure. (IS) **Design**: ▪ 2.3 Set up a technical design for the use of an infrastructure, including related security measures based on functional and non-functional requirements. (IS) **Implement**: ▪ 3.3 Set up an integrated multi-level ICT environment in order to implement central monitoring of the quality and security of ICT services. (IS)
Requirements for	▪ Propedeuse achieved.

participation in units of study (See also Article 29 TER)	▪ Internship completed satisfactory.
Specific details	None.

Assessment: Netwerk Security - 1916SEC03A

Assessment objectives/criteria	Upon completion of this course, students will be able to: ▪ Describe security threats facing modern network infrastructures; ▪ Secure Cisco routers and switches; ▪ Describe AAA functionalities and implement AAA on Cisco routers using local router database and server-based ACS or ISE; ▪ Mitigate threats to networks using ACLs and stateful firewalls; ▪ Implement IPS and IDS to secure networks against evolving attacks; ▪ Mitigate threats to email, web based and endpoints attacks and common Layer 2 attacks; ▪ Secure communications to ensure integrity, authenticity and confidentiality; ▪ Describe the purpose of VPNs, and implement Remote Access and Site-to-Site VPNS; ▪ Secure networks using ASA.	
Details of assessments	Written MC test.	
Strategies and teaching activities	Lecture	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Pen and scrap paper.	

Assessment: Netwerk Security Practical - 1916SEC03B

Assessment objectives/criteria	Upon completion of this course, students will be able to: ▪ Create a Basic Technical Security Policy; ▪ Configure Basic Device Settings; ▪ Configure Secure Router Administrative Access; ▪ Configure a Zone-Based Policy Firewall; ▪ Secure Network Switches; ▪ Configure ASA Basic Settings and Firewall; ▪ Configure a DMZ, Static NAT, and ACLs on an ASA; ▪ Configure ASA Clientless SSL VPN Remote Access Using ASDM.	
Details of assessments	Practical Skills Assignment.	
Strategies and teaching activities	Workshops with skills labs.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	Student scan use internet, netacad course and powerpoint slides.	

Information Security - 1916SEC04Z

Content of unit of study	The content of this module includes the material of the Exin module Information Security Foundation. (based on ISO27002) See also www.exin.nl.

	Companies need to secure their valuable information. This starts with informing and training employees and thereby raising awareness of the risks. The module provides insight into which measures need to be taken. It also deals with legal aspects of information security.

Learning outcomes	1. You gain knowledge about the understanding, importance and reliability of information.
	2. You learn about the different types of risks, threats and damage, and about the risk strategies available and the security measures you can take.
	3. You gain insight into the security policy and the organisation, including the code of conduct, ownership, incident management, roles and responsibilities.
	4. You will learn about various security measures.
	  1. Physical measures such as identity cards and finger scans.
	  2. Technical measures such as cryptography, and you learn to deal with attacks, such as phishing, spam and malware.
	  3. Organisational measures you can take, such as Access Management and Business Continuity Management.
	5. You will be made aware of legal aspects of information security, which are important for an IT developer.

Requirements for participation in units of study (See also Article 29 TER)	Propedeuse completed. Internship completed satisfactory.
Specific details	None

Assessment: Information Security - 1916SEC04A

Assessment objectives/criteria	The student is able to understand, implement and control Information Security and Privacy guidelines.	
Details of assessments	Written MPC exam and/or Open questions	
Strategies and teaching activities	Instructional lecture.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None	

Secure Programming - 1918SEC05Z

Content of unit of study	This course reveals the most common design and coding errors and explains how to fix each one-or better yet, avoid them from the start. This course covers all platforms, languages, and types of applications. Eliminate these security flaws from your code: SQL injection Web server- and client-related vulnerabilities Use of magic URLs, predictable cookies, and hidden form fields Buffer overruns Format string problems Integer overflows C++ catastrophes Insecure exception handling Command injection Failure to handle errors Information leakage Race conditions Poor usability Not updating easily Executing code with too much privilege Failure to protect stored data Insecure mobile code Use of weak password-based systems Weak random numbers Using cryptography incorrectly Failing to protect network traffic Improper use of PKI Trusting network name resolution.
Learning outcomes	**Analyse**: ▪ 3.9 Describe security aspects of computer systems connected to or through (public) networks (SW) ▪ 3.11 Describe security aspects of computer systems linked to or through (public) networks. (HW) **Advise**:

	▪ 3.4 Advise on the choice of software architecture or software frameworks, in which cost and quality aspects such as availability, performance, security and scalability play a part. (SW)
Requirements for participation in units of study (See also Article 29 TER)	▪ Propedeuse achieved. ▪ Internship completed satisfactory.
Specific details	None.

Assessment: Secure Programming - 1918SEC05A

Assessment objectives/criteria	The student is able to analyze the following security risks: ▪ Sin 1, SQL Injection ▪ Sin 10, Command Injection ▪ Sin 12, Information Leakage ▪ Sin 5, Buffer Overruns ▪ Sin 20, Weak Random Numbers ▪ Sin 21, Using Cryptography Incorrectly ▪ Sin 24, Trusting Network Name Resolution ▪ Sin 4, Use of Magic URL's, Predictable Cookies, and Hidden Form Fields ▪ Sin 2, Web Server-Related Vulnerabilities ▪ Sin 3, Web Client-Related Vulnerabilities (XSS) ▪ Sin 9, Catching Exceptions ▪ Sin 11, Failure to Handle Errors Correctly ▪ Sin 22, Failing to Protect Network Traffic ▪ Sin 17, Failure to Protect Stored Data ▪ Sin 13, Race Conditions ▪ Sin 19, Use of Weak Password-Based Systems ▪ Sin 23, Improper Use of PKI, Especially SLL ▪ Sin 7, Integer Overflows ▪ Sin 6, Format String Problems ▪ Sin 16, Executing Code with Too Much Privilege ▪ Sin 8, C++ Catastrophes ▪ Sin 18, The Sins of Mobile Code ▪ Sin 15, Not Updating Easily ▪ Sin 14, Poor Usability	
Details of assessments	Written test and assignments.	
Strategies and teaching activities	Lecture.	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	None.	

Professional Presenting - 1916GE011Z

Content of unit of study	For research during optional education, the student carries out a research into an IT Trend in a team context. The team provides a presentation to fellow students about this trend, making use of multiple interactive and didactic teaching methods. To prepare this presentation, each team writes a plan describing the objectives, work forms and planning of the implementation of the presentation. The presentation itself is assessed according to fixed criteria and forms the test of this course.
Learning outcomes	**Professionalisation**

	6.3.1 Self-management skills ▪ Recognises areas where he/she could do better and formulates learning objectives based on feedback and self-reflection; ▪ Takes his/her task and role seriously. **6.3.2 Social-communicative ability** ▪ Can pass on knowledge, insights and skills to others; ▪ Can give and receive feedback; ▪ Can express him/herself effectively both orally and in writing, using correct, comprehensible and appropriate language; ▪ Can report on the results achieved and the process. **6.3.3 Creativity and problem-solving skills** ▪ Comes up with new ideas, approaches or insights; ▪ Presents in a professional way using interactive and didactic techniques and skills. **Research skills** ▪ 3.1. can identify the relevant aspects of a complex problem; ▪ 3.2. can formulate an objective and research questions clearly based on the problem analysis.
Requirements for participation in units of study (See also Article 29 TER)	To be able to start electives, the following entry requirements must have been met: ▪ The first year of the programme must have been completed successfully. ▪ The Year 3 work placement must have been completed successfully. ▪ A minimum of 130 ECTS credits must have been obtained.
Specific details	None

Assessment: Professional Presenting - 1915GE011A

Assessment objectives/criteria	**Presenting test criteria professionally** ▪ The student can convey knowledge, insights and skills to others, based to knowledge level and interest of the target group; ▪ The student can convey research results to peers in the form of a professional, interactive presentation using a wide range of teaching methods and presentation techniques. To prepare for this, the student will define objectives and produce a plan in which the presentation is planned and structured. ▪ The student can formulate objectives for the transfer of knowledge and skills, select the teaching methods that are most appropriate for doing so and incorporate them in a *plan* The lesson delivered will be assessed based on the following criteria: ▪ Objective: is it clear what the students want to achieve through the presentation? ▪ Initial scenario: do the students explore the initial scenario and respond to it adequately? ▪ Content: is the material delivered in a structured way and in a manageable quantity? ▪ Work form (s): Does the work form used match the objective and is it being implemented properly? ▪ Teaching method(s): is the teaching method used in line with the objective and is it implemented effectively? ▪ Learning resources: are the learning resources used in line with the objective and are they used effectively? (PowerPoint, Moodle, …) ▪ Wrap-up: do the students wrap the presentation up effectively? Do they come back to the objective? Do they review the situation? ▪ Presentation skills: how do they use voice, speaking rate, posture, eye contact? ▪ Interaction: Do they actively make use of interaction with their audience?
Details of assessments	The students prepare a plan based on the test criteria. The presentation is based on the plan. The presentation is evaluated and assessed by students and teachers present. Presenting research professionally Planning and providing a lesson about the current IT trend chosen. The lesson plan is a conditional requirement. Teaching in accordance with requirements (assessment form, see test criteria).
Strategies and	Two lectures, a consultancy and feedback meeting and a workshop/presentation to be executed by the

teaching activities	students. In professional presentation skills, a workshop is prepared and presented in groups on the ICT topic chosen in research paper. Two lectures and a feedback moment are planned for this. In addition, two presentations/workshops from fellow students are visited.	
Compulsory attendance (See also Article 115 TER)	Yes	Yes for the seminars
Permitted aids	Teaching material, teaching aids.	

Project Offensive Security - 1922SEC06Z

Content of unit of study	Almost daily news reaches us that the government or companies are dealing with cyber-attacks by hackers. Today's software engineering professionals must understand the basic discipline of building secure software. Not because "it's a good idea", but because the nature of the internet mandates it. This course covers penetration testing. You will learn how the target system works, the weaknesses of this system and how to practically exploit these weaknesses and hack into it.
Learning outcomes	**Analyze**: ▪ 3.9. Describe security aspects of computer systems that are linked to or via (public) networks (SW); ▪ 3.11. Describe security aspects of computer systems that are linked to or via (public) networks (HW). **Advise**: ▪ 3.4. Advising on the choice of software architecture or software frameworks, in which cost aspects and quality characteristics such as availability, performance, security and scalability play a role (SW).
Requirements for participation in units of study (See also Article 29 TER)	☐ Propedeuse achieved. ☐ Vocational internship with a pass
Specific details	

Assessment: Project Offensive Security - 1922SEC06A

Assessment objectives/criteria	Present your findings in a technical report in the following format (English or Dutch): **Management summary** 1. Introduction; 2. Approach and scope. The technical specifics of the test: what will be tested and what not? ▪ Findings For each topic: 1. The vulnerability and risk; 2. How to exploit; 3. Remediation; 4. Conclusion. Possible topics: ▪ The student is able to use public information (osint) to target and construct social engineering attacks. or ▪ The student is able to find as many vulnerabilities as possible in a website. By a vulnerability we mean

	shortcomings that can affect the availability, integrity and / or confidentiality. or ▪ The student is able to find as many vulnerabilities as possible in a API. By a vulnerability we mean shortcomings that can affect the availability, integrity and / or confidentiality of the API. or ▪ The student is able to gain control of a computersystem using offensive security.	
Details of assessments	Assessment and presentation	
Strategies and teaching activities	Consult	
Compulsory attendance (See also Article 115 TER)	No	
Permitted aids	N/a	