Implementation Regulations CER HZ

Bachelor

HBO-ICT

Full-time

CROHO 30020

2023-2024

INDEX

Version history

No.	*Summary*	*Assignee*
0.1	*Initial setup to be presented to OC*	*MM*
0.2	*Feedback programme committee incorporated*	*MM*
0.3	*Update layout and language chapter*	*MM*
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CHAPTER 1 GENERAL PROVISIONS

1.1 General

1.1.1 The HZ Course and Examination Regulations Bachelor programme full-time (hereinafter: CER HZ) cover the core of education within the HZ. This document provides a general overview of all programmes taught at the HZ. The CER HZ contains institution-specific provisions i.e., those that apply to the entire HZ. A programme-specific CER HZ Implementation Regulation (hereinafter: Implementation Regulation) is determined for each programme by the executive board each year.

1.1.2 The HZ Course and Examination Regulations Bachelor programme full-time applies to this HZ CER Implementation Regulation Bachelor programme full-time.

1.1.3 The Dutch Higher Education and Research Act (WHW) as well as the CER HZ mention study credits. These Implementation Regulations, in addition to the term credits, also refer to ECTS (European Credits Transfer System), where 1 ECTS is equal to 1 credit and thus a study load of 28 hours (article 7.4 paragraph 1 of WHW).

1.2 Establishment and evaluation

1.2.1 The process of establishment and evaluation of this Implementation Regulation is described in article 1.3.4 CER HZ.

1.2.2 The programme committee evaluates the manner of implementation of the education and examination regulations and the Implementation Regulations in question every year (article 1.3 CER HZ).

CHAPTER 2 IMPLEMENTATION REGULATIONS HZ CER

2.1 Registration, prior educational requirements, and admission policy

2.1.1 Overview of additional prior educational requirements (article 2.2 and 2.3 CER HZ)

Legend

✓ *Admissible*

X *Not admissible*

Students with a HAVO diploma				
Havo profiles:	**NT**	**NG**	**EM**	**CM**
Admissible:	✓	✓	✓	✓

Students with a VWO diploma				
Vwo profiles:	**NT**	**NG**	**EM**	**CM**
Admissible:	✓	✓	✓	✓

2.1.2 **International enrolment 240 EC Track** (article 2.2, 2.3, 2.8 CER HZ ba ft)
International students are admissible to the standard four-year programme only, if Nuffic has determined that their diploma is equal to the Dutch HAVO or VWO diploma.

2.1.3 **Deficiency investigation** (article 2.4 CER HZ ba ft)
The holder of a diploma that does not meet the admission requirements (deficiency) (see article 2.1.1.) may be admitted on the condition that the requirements for the contents are met by means of a deficiency investigation. The deficiency investigation for the study programme ICT is an assessment of the knowledge and skills comparable with the Dutch HAVO level. If the candidate is able to prove by means of the assessment that he or she possesses the required knowledge, he or she will be admitted to the study programme. An assessment for deficiency investigation requires a minimal age of 21 years.

2.1.4 **Additional requirements** (article 2.5 CER ba ft)
No additional requirements apply to the HBO-ICT Programme.

2.2 Programme and education structure

2.2.1 ***Programme profile*** (article 3.2 CER HZ)

The ICT study programme profile is based on the Bachelor of ICT domain description of HBO-I (Applied Higher Educational ICT-programs) [1][2]. The domain description is a functional qualifications framework for universities, focusing on the starting proficiency of future ICT professionals. It is a national framework for the final qualifications for graduates of Dutch programmes for higher professional education in the ICT domain at an Associate, Bachelor, and Professional Master degree level. Maintained by the HBO-I foundation, the domain description is periodically updated in collaboration with the business community and is established by The Netherlands Association of Universities of Applied Sciences.

The domain description outlines relevant competencies, the breakdown of competencies into professional duties, and examples of characteristic professional situations of starting ICT professionals. These examples function as illustrations of elements of the model and create a clear connection with the professional practice. The domain description will be regularly modified and updated to keep up with the rapidly developing ICT field. A Data Science addendum for the domain description has been developed by a HBO-I task force, and an architectural layer, Data Science, has been added to the program.

The program focuses on solving problems or improving processes by using ICT, with programming skills being an essential skill. However, the main focus is on analytical and problem-solving skills, with professional skills being a crucial focus throughout the program. The program focuses on three main aspects, namely data science, software engineering, and IT consulting.

Real-life cases are an essential focus of the program, with themes chosen in the sectors that are important to the Dutch and Zeeland (local) environment. These themes focus on water-related issues, issues concerning the energy transition, renewed food sources, and a vital region to live in, such as safety, quality of life, and mobility.

ICT graduates are characterized by analytical, problem-solving, and strong advising skills, and they are adaptable to change, service-oriented, and able to communicate clearly and reflect on their professional life on a structural basis. The program teaches students to use ICT for good and equips them with a strong moral and ethical compass.

IT graduates can work in a wide variety of IT jobs, including managerial positions such as project manager or senior developer, head of department, senior consultant, team lead, SCRUM master, instructor/supervisor, and IT professional. They could also end up working in the educational sector as a teacher or supervisor or in a commercial position in the private sector. An HBO degree in ICT also forms a good basis for a professional master or academic master programme in software engineering, data sciences, artificial intelligence, computer science, security, or more specific oriented IT masters in a certain field, which can be taken in an accelerated form at one of the research universities.

[1] Based on the 2018 version of the HBO-I domeinbeschrijving (https://HBO-I.nl/domeinbeschrijving/ (retrieved, March 29, 2023)

[2] Note: the national profile of HBO-I is due to be renewed in Q4 of 2023

2.2.2 ***Learning outcomes*** (article 3.2 CER HZ)

The ICT program is offered in Dutch and English. These competences are according to the HBO-I domain description (see article 2.2.1). with data science as an addition. The profile matrix that is designed for the domain description contains three dimensions named in figure 1.

Dimension	**Represents**
Activity • Analysis • Advise • Design • Realisation • Manage & Control	what does an ICT professional do?
ICT-architectural layers • User interaction • Organisational Processes • Software • Infrastructure • Hardware interfacing • Data science	within which context?
Proficiency levels [3]	how complex is it?

Tabel 1: Dimensions of the domain description Bachelor of ICT

[3] The proficiency level is determined by the complexity of the context, the complexity of the content and level of autonomy involved in carrying out the assignment. A proficiency level is achieved when two of these facets reach the level concerned. For the third proficiency level, the autonomy and the complexity can be at level three of the context level, for example, while the complexity of the content is at level two. But it is also possible that the complexity of the context and the content are at level three while the autonomy is at level two. Further explanation of the four proficiency levels is in the domain description chapter 2.1.

Cohorts 2019-2020 and newer

Our ICT bachelor program offers a comprehensive curriculum that prepares students for a wide range of roles in the field of information and communication technology. During the first two years, students follow a common core curriculum that provides a solid foundation in technical ICT skills, personal development and develop a good understanding of the 3 tracks offered in the program. In the first year, students learn to use the necessary tools for software development, while the second year focuses on digital innovation and transformation, exploring how ICT can create value for customers. Students also gain exposure to data science and AI during this phase.

To provide students with greater flexibility in their studies, we offer two elective courses during the second year: data-driven business and software design, and data visualization and cloud computing. The former is tailored for students pursuing the Business IT Consultant or Data Science track, while the latter is geared towards those following the Software Engineering or Data Science track.

Upon completing the second year, students have the option to choose from three different study tracks: Software Engineering (SE), Data Science (DS), and Business IT Consultant (BIC). The chosen track will be indicated on their official certificate (HBO-ICT) as an addendum. The program's overall profile is illustrated in Table 2, while Appendix 3 provides a detailed breakdown of the three tracks and their respective profiles.

In summary, our ICT bachelor program provides students with a well-rounded education in the fundamentals of software engineering, digital innovation, and data science. With the understanding that BIC is present in all education from overview perspective. With the flexibility to choose from different study tracks and elective courses, students can tailor their education to their interests and career aspirations.

	Analysis	Design	Realisation	Advise	Manage & Control
User Interaction	2	2	2	0-2	
Organisational Processes	2-3	1-3	0-2	2-3	0-3
Infrastructure	0-1	0-2	1	0-2	2
Software	2-3	2-3	1-3	0-3	3
Hardware Interfacing	1		0-1		
Data Science	0-3	0-3	0-3	0-3	-
Professional Skills	3	2-3	3	3	

Tabel 2: Program profile from cohort 2020-2021 and newer

Description of the programme learning outcomes of the programme

1. User interaction	
1.1 analyse	
B	You describe the important consequences for UX based on a target group analysis[B5] & [B6]
1.2 Design	
B	You describe UX test strategies suitable for a given situation[B5]
1.3 Realise	
A	You can apply design guidelines and corporate branding when realising a simple interaction within an information system [B3]
B	You can realise a simple interaction within a team while taking into account consistency and standards [B3]
C	You can help a user with preventing, recognising and solving erroneous actions in a consistent manner within a team [B4]
D	You can help a user with recognising and solving erroneous actions [B4]
E	You can apply standards and internal consistency when developing more complex functions within an application [B4]
K	You describe the correct implementation of UX design choices [B5]
L	You write a UX report accounting for design choices based on guidelines, human factors and/or emotional design.[B6]
M	You test the UX of a product in a UX test report to evaluate the quality[B6]
N	You recommend further development steps based on the UX test report[B6]
1.4 Advise	
A	You can draw up a datavision goal based on the project context and business goal taking into account the goal, the target group and the message. [B8]
B	You can make a sound choice for a datavisualisation type suitable for the datavisualisation goal [B8]
C	You can make a sound choice for visual elements suitable for the datavisualisation goal [B8]
D	You can realise a datavisualisation based on sound research. [B8]
2. Organization processes	
2.1 analyse	
A	map, according to the given methodology, the current situation of a singular company process (IST) [B3]
B	analyse the performance of an organization through a standard methodology. [B7]
C	map an organization process of an existing organization by using suitable methodologies. [B7]
D	you assess a given situation on various security aspects. [B7]
E	you understand the importance of a sound BI report (B14)
F	you understand what the necessity of BI is for companies (B14)
G	You can independently make a validated process analysis for an ICT provision in the context of an internship [INTERNSHIP BIC]
H	you clarify the company's current situation through coordinated KPIs and an obtained data set and you make an inventory of where the company can still take steps for improvement. Taking into account improvements in, among other things, new technologies.[S7]
I	you map the branch and the company and you analyse how that process contributes to the company's goals [B7]
J	You can independently make a validated process analysis (IST) for the ICT provisions in a complex context [S8]
K	Students are capable of understanding the need for business to embrace data and can report what their maturity in this field is [B7]
L	You analyze and evaluate the impact of Business Intelligence (BI) on the architecture of an organization from the perspective of Enterprise Architecture.
M	You Acquire practical skills for conducting an IT consultancy project [B4]
2.2 Design	
A	describe, according to a given methodology, a design for an improved company process through ICT (soll) [B3]
B	you can map sound change strategies, so that you can choose the right strategy for the right change/company in a methodical way. (B13)
C	you understand the ETL and the matching report process. (B14)
D	You can independently make a validated process design and understand the relationship with the information provision in the context of an internship. [INTERNSHIP BIC]
E	you analyse the IST of the processes within the company and you come up with realistic improvement proposals based on the various models and your own vision (SOLL). [S7]
F	You can independently make a validated and considered process design (SOLL) in a complex context. [S8]
2.3 Realise	
A	you create KPIs for a dataset that you substantiate yourself and create a matching BI report. (B14)
B	you carry out the entire process from importing the data to creating the report. (B14)
C	you realise and evaluate an implementation (plan) based on your own design, so the company has a ready made plan to follow through with the implementation of the changes. [S7]
D	you describe (and carry out if possible) a relevant change management method and strategy in which you help the employees with the changes they are about to encounter so that you can help resolve possible resistance. [S7]
E	You independently realise an implementation(plan) and test the acceptance in a complex context. [S8]
2.4 Advise	
A	you submit a sound analysis report based on a company organization analysis. [B7]
B	You can independently give thorough organizational advice by using ICT possibilities in the context of an internship. [INTERSHIP BIC]

C	you advise in a well-argued manner the best option for change based on your own vision/core values, a theoretical change model and the core values of the company. [S7]
D	You can independently give a sound organizational advice for implementing ICT possibilities in a complex context. [S8]
E	Students understands how a company's data maturity fits in a broader context of data strategy [B6]
F	Students can advise about the future perspective of data driven business. [B6]
2.5 Manage & Control	
A	You can independently draw up a management plan for ICT processes in a internship context according to a chosen framework, taking into account updating, design, maintenance and quality assurance. [INTERNSHIP BIC]
B	you manage the company processes and ensure that they grow with the company or that there is a plan with which these processes are kept up-to-date, taking into account updating, design, maintenance and quality assurance. [S7]
C	You can independently draw up a control plan for ICT processes in a complex context. [S8]
3. Infrastructure	
3.1 analyse	
3.2 design	
A	The student can design a solution for a given project, making use of a cloud provider and taking into account the given preconditions.[B8]
3.3 Realise	
A	Make available a software system based on a Framework for users in a simple hosting environment [B4]
3.4 Advise	
A	The student can advise for a given project how it should be adapted to be able to use the functionalities of a cloud provider. [B8]
3.5 Manage & Control	
A	The student can select and employ and react accordingly on the generated metrics for a cloud application control tools. [B8]
4. Software	
4.1 analyse	
A	(group) you determine the systems context of a system to be developed [B3]
B	(individually) you collect relevant data from one single requirement's source through a given elicitation technique [B3]
C	(individually) you interpret collected data from the functional perspective to formulate and document requirements according to given standard method in natural language [B3]
D	develop acceptation criteria for a user story [B4]
E	you determine the System and the Systems context for a system to be developed with one interested party [B4]
F	you collect information so as to formulate functional requirements for a system to be developed according to a standard method [B2]
G	you document functional requirements for a system to be developed in natural language and in models through a given standard method [B4]
M	you can map the trust boundaries of a complex system. (B14)
N	You can independently make an analysis of a software engineering design problem in an internship context. [INTERNSHIP SE]
O	you describe functional and quality specifications and limiting preconditions, in which at least maintenance and manageability are included in the local infrastructure and development processes. [S7]
P	you use various types of sources and techniques for collecting specifications and preconditions. [S7]
Q	You can validate the formulated specifications and preconditions and thus assess the degree of completeness and objectivity. [S7]
R	You can thoroughly describe a technical and/or process-related problem concerning the production of software.
S	You independently make an analysis of a software engineering design problem in a complex context [S8]
T	You develop empathy for stakeholders to determine their challenges [B5]
U	You create innovative ideas based on a defined problem [B5]
V	You develop a prototype based on a validated idea [B5]
W	You test the prototype extensively to come up with new insights. [B5]
4.2 design	
A	you design a database of a simple information system and document this by means a standard modelling technique [B3]
B	You can make a functional design of a simple function of a system yet to be developed, and document it through a standard modelling technique. [B3]
C	You can make a technical design of a simple function of a system as yet to be developed, and document it be means of a standard modelling technique [B3]
D	you communicate more complex concepts and designs univocally with the professional field [B4]
E	you write a technical description of (the internal) structure and working of an Object Oriented information system.[B2]
F	You can solve a problem occurring in the market and involve the right stakeholders. [B6]
G	you generate new insights by translating a solution into an MVP, test it, and analyse the metrics (results) [B6]
I	you make a first overview of a business model. [B6]
J	you describe the needs of the users of the software system to be developed.[B6]
K	you draw up a functional design for a complex part of a software system [B6]
L	you determine the quality of the design, for example through testing or prototyping, taking into account the formulated quality characteristics (ISO 25010) [B6]
M	you demonstrate the success of the solution in an organized way through metrics developed [B6]
N	you write a techspecs report as reference that can be transferred to third parties [B6]
O	you recognise and explain with which programming techniques you can solve certain software problems (B13)
P	You can independently select, document, communicate and evaluate solutions for a software engineering design problem in an internship context using tests and prototypes [INTERSHIP SE]

Q	you evaluate solutions based on the stated specifications and limitations (consistency) using tests, prototypes and comparable techniques. In addition, you analyse data collected with qualitative and/or quantitative analysis techniques. [S7]
R	you select candidate solutions based on relevant, current and specialist professional knowledge from the ICT domain. [S7]
S	you apply appropriate schematic techniques in the document where possible, which are in line with the chosen design strategy and goaled at the target group, which in any case consists of developers who (further) develop the product. [S7]
T	You can independently select, evaluate (partial), document and communicate solutions for a software engineering design problem in a complex context. [S8]
U	You can create measurable non-functional requirements for a given system [B5]
V	You can design a substantiated architecture of a software system [B5]
W	You can derive and interpret performance metrics for a given system [B5]
4.3 Realise	
A	You can realise a simple function within given concepts of a Framework [B3]
B	You can test a software system based on a Framework on the own work environment [B3]
C	Deliver Code that is acceptable for a production environment [B4]
D	Within a given framework context apply a more complex concept [B4]
E	Within a given organization and framework context develop an innovation [B4]
F	you apply Object Oriented programming concepts to realise functionality.[B2]
G	you apply programming concepts to realise functionality (Miller: 1. prescriptive, 2. applying) [B1] [B2]
H	you write readable, well-organized code (Miller: 1. prescriptive, 2. applying) [B1] [B2]
I	you make robust code (Miller: 1. prescriptive, 2. applying) [B1] [B2]
J	Indicate for a given code example/class diagram which design patterns were applied. [B5]
K	Apply a suitable design pattern for a given situation and work it out in both a class diagram and actual code. [B5]
L	Recognise weak points in code, so-called code smells, and apply an appropriate standardised remedy, so-called refactoring. [B5]
M	you apply the right combination of programming techniques for the problems in a complex software system.(B13)
N	you perform a security audit through a given model. (B14)
O	You can independently realise a suitable solution for a software engineering design problem in an internship context. [INTERNSHIP SE]
P	you realise (prototypes of) a system existing of several sub systems and/or existing components [S7]
Q	You can do research into the quality of the realised software such as functionality, security and performance. [S7]
R	You independently realise a suitable solution to a software engineering design problem in a complex context, independently. [S8]
S	You can implement a component for a given architecture [B5]
4.4 Advise	
A	You can independently give a suitable advice for solving a software engineering design problem in an internship context. [INTERNSHIP SE]
B	you write a suitable advice on the results of a security research that was held. (B14)
C	you explain the results of the security audit according to a model. (B14)
D	you advise the customer on a solution for a software problem, convince the customer that the solution is in line with his/her objective and vision and you support the customer in the implementation of the solution or you give you process-oriented advice. [S7]
E	You independently give a suitable advice for solving a software engineering design problem in a complex context. [S8]
4.5 Manage & Control	
A	You can organize and use tools to exchange code and documentation within a team [B3]
B	Use the project tools to improve the process of analysis, design, realization, testing and making functions available in an application[B4]
C	You can set up an environment on your working environment using virtualization and use it to test code. [B3]
D	you set up (generic) servers to make an application available [B4]
E	you use containerization to make an application available and modify it [B4]
F	Master the advanced features of the distributed version control system (DVCS) Git to enable effective collaboration on a software project. [B5]
G	Achieve manageability of your software project releases by choosing a branching model and corresponding workflow. [B5]
H	Design a deployment pipeline that runs an existing open source software application and generates an automatic build. [B5]
I	Proof your solution by performing a complete release from a change in code that generates corresponding executables executing all the steps of a release management cycle. [B5]
J	Guarantee software quality by enabling quality tools and executing unit tests.[B5]
K	you ensure confidentiality of a data set by applying cryptography [B7]
5. Hardware Interfacing	
5.1 analyse	
A	you describe the foundations of a computer system [B1]
6. Data Science (Cisp-DM Cycle)	
6.1 You set up a data Science process	
CRISP-DM phase(s): Business Understanding + Data Understanding	
A	You can define and report the customers organisation and its problem [B7]
B	You can define & provide data mining goals [B7]
C	You can define business objectives and are aware of the need of information by the business [B7]
D	You can collect provided data sets and make them usable for the data science process [B7]
E	You describe collected and needed data by data types and metadata [B7]
F	You define data mining goals success criteria [B8]

G	You describe data mining activities based on choice of a basic machine learning model and relevant required activities [B8]
H	You add extra self-organised and/or external data sources to the data science process [B8]
I	You can compose a data management plan for a specific project, taking in account al facets of a given, recognised standard. (B14)
J	You describe data mining activities based on choice of the best applicable machine learning model and relevant required activities [S7]
K	You can independently set up a data science process in a internship context. [INTERNSHIP DS]
L	You can independently set up a data science process in a complex context. [S8]
6.2 You collect and address relevant data	
CRISP-DM phase(s): Data Understanding + Data Preparation	
A	You generate basic statistics summaries exploring data [B7]
B	You create a basic quality description to validate relevant data [B7]
C	You will exclude/include rows & columns to select relevant data [B7]
D	You clean data in order to achieve correct data types and handle missing values [B7]
E	You will perform basic feature extraction to construct correct and usable data [B7]
F	You are capable of converting data in correct formats to visualize data [B7]
G	You (re-)validate data after model generated assumptions [B8]
H	You clean data by imputating and scaling relevant data [B8]
I	You construct data by one-hot-encoding, defining targets & labelling relevant data [B8]
J	You integrate relevant data by merging multiple data sources [B8]
K	You convert data formats as prerequisite for relevant model(s) [B8]
L	You validate data through statistical testing [S7]
M	You imputate relevant values to the chosen data to substitute missing values [S7]
N	You construct data by feature extracting (aggregates, target encoding) and/or unstructured data [S7]
O	You integrate relevant data by merging & joining across multiple levels [S7]
P	You convert data formats using sparse representation and include useful generators to enhance performance of your techniques [S7]
Q	You independently collect and address relevant data in a internship context [INTERNSHIP DS]
R	You independently collect and address relevant data in a complex context [S8]
6.3 You perform data analysis	
CRISP-DM phase(s): Modelling	
A	You define metrics, independent records, & targets to generate a test design [B7]
B	You build the model and benchmark the predictions with basic statistic tooling [B7]
C	You assess relevant model(s) by the chosen metric [B7]
D	You split data into test & train sets to generate a test design [B8]
E	You build & train relevant model(s) and create predictions using the model(s) on test data set [B8]
F	You assess the model(s) on chosen metrics of the defined success criteria [B8]
G	You define a test design using cross validation & time splits [S7]
H	You build a model taking feature selection, model tuning, bias, variance over/under fitting & learning curves into account [S7]
I	You asses your model outcome using advanced metrics and graphical aids [S7]
J	You can independently perform data analysis in a internship context. [INTERNSHIP DS]
K	You can independently perform data analysis in a complex context. [S8]
6.4 You evaluate & deploy results of the data science process	
CRISP-DM phase(s): Evaluation + Deployment	
A	You summarise and evaluate results with business objective(s) [B7]
B	You set up a list of actions to determine following steps [B7]
C	You produce a final report and present this to customer [B7]
D	You review the data science process and you determine, and also report, lessons learned [B7]
E	You evaluate and match success criteria with business objectives of the data science process [B8]
F	You determine next steps and setup an advisory report for follow-up [B8]
G	You produce a deliverable for customer [B8]
H	You review the data science process and collect lessons learned on process & product [B8]
I	You determine the next steps in a additional data science process cycle providing a conclusion supplemented with recommendations [S7]
J	You advice the business successively implementing the data science process by a plan [S7]
K	You can independently evaluate and deploy results of a data science process in a internship context. [INTERNSHIP DS]
L	You can independently evaluate and deploy results of a data science process in a complex context. [S8]
7. Professional Skills	
7.1 Professional Skills	
M	you can employ the right professional skills to complete a project successfully in a complex environment [S7]
N	you account for the choices made regarding the professional skills employed [S7]
O	you can independently in a complex environment employ the right professional skills to complete a project successfully (S8)
P	you account for the choices made regarding the professional skills employed. (S8)
Q	You can function professionally in a company-related, ICT-related environment. [INTERNSHIP]

7.2 show personal leadership. Year 1=Level 1 (Context: structured, predictable, known solution Content: Some of the basic concepts). Year 2 = Level 2 (Context: structured, unpredictable problem known solution space limited Contents: Several basic concepts and some in-depth concepts).	
D	you form an ethical opinion on a security-related case, taking into account the opinions of people who may think differently. [B7]
K	You can create a website as introduction to the program, include your motivation and show that you improve the website based on received feedback. Leading to a website that is improved in quality and attractiveness [B1]
L	Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals.
M	Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals through participation in a project week.
N	Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to personal goals through participation in an international week.
O	You're considerate, see opportunities and seize them. You have a proactive attitude that you take initiative and feel responsible for what you do.
P	You can motivate yourself and others, you are willing to help others / support (individual and team). You can present yourself or a team, take others into your own development.
Q	You study demonstrates considered, strengthens your own learning and can recognize a learning need in yourself and mating act, reflect, evaluate, and give active feedback questions. You recognize when you need help and do it then.
R	You can specify what type of professional you want to be and / or what type of positions you aspire, know your own strengths and weaknesses and can describe yourself well.
7.3 Interact purposefully. Year 1=Level 1 (Context: structured, predictable, known solution Content: Some of the basic concepts). Year 2 = Level 2 (Context: structured, unpredictable problem known solution space limited Contents: Several basic concepts and some in-depth concepts).	
A	you read IT-oriented English literature on HBO entrance and can extract the necessary knowledge from it
B	you write IT-related English documentation on HBO entrance level, suitable for the message you want to convey and aimed at the target group.
C	You focus on the various groups of stakeholders such as partners, interest groups, individual team members etc.
D	You focus on what you want to communicate and what purpose you choose the most appropriate form and while you perform this proactively.
E	You focus on your role in the context of the ICT job, you recognize these tasks and takes proactive. You dare others to speak (feedback) and is open to feedback. You are open to other opinions / views / arguments and see that as an enrichment. You consciously builds confidence in an interdisciplinary and intercultural cooperation context.
F	~~you have mastered the Dutch (for Dutch track) or the English (for English and Dutch track) language in writing on level 3F(B2) (conditionally and thus tick-off test within the course)~~
H	You can read English for orientation (B2/C1)
I	You can write formal English texts (B2/C1)
J	You can give in English an verbal presentation
K	you can communicate in a sound way with various departments within a company, taking into account hierarchical layers. (B13)
L	As a project group you can report and present professionally, both verbally and in a report. [S7]
M	As a project group you deliver structured products and account for everyone's role within the project, the method followed and evaluate the process and the product critically [S7]
N	You can report and present professionally, both verbally and in a report [S8]
O	You deliver structured products, account for the method followed and evaluate the process and the product critically. [S8]
P	Students can present their project, the content of their portfolio and their process considerations in a sound way making plausible the equal contribution of each project member to the project.
Q	as a team you can communicate your research in an organized way, appropriate for the audience.
R	Students are able to deliver a solid product demonstration to the stakeholders in which they demonstrate the product and address the main challenges and present a realistic roadmap.
7.4 Organize in a future-oriented way. Year 1=Level 1 (Context: structured, predictable, known solution Content: Some of the basic concepts). Year 2 = Level 2 (Context: structured, unpredictable problem known solution space limited Contents: Several basic concepts and some in-depth concepts).	
L	Gives evidence that you are able to think ahead and plan ahead. You think methodically about the approach suitable for the assignment (identification of tasks, order of execution, proper prioritization) and how this contributes to the end result.
M	You plan and monitors the time. You are cost conscious. You recognize opportunities and risks. You can thereby all time aware of agreements, legal regulations and ethical standards.
N	You have a keen eye for the feasibility of duties in the organization. You taking into account the characteristics of the area of the assignment.
O	You examine where necessary and relevant to the ethical implications of the tasks you perform. You recognize their own and others' limits and act accordingly.
P	You can construct achievable and realistic goals within the time available which contribute to solving a problem or achieving a demand. The goals can be divided into multiple related detailed tasks.
7.5 Solve problems in a research-oriented way. Year 1=Level 1 (Context: structured, predictable, known solution Content: Some of the basic concepts). Year 2 = Level 2 (Context: structured, unpredictable problem known solution space limited Contents: Several basic concepts and some in-depth concepts).	
A	you can make a proposal for a sufficiently complex graduation assignment (B13)
B	you can draw up a graduation plan for a complex graduation assignment. (B14)
C	as a team you can deep dive in a new innovative technique/technology. Gaining knew knowledge by researching the way that is works and validate it by using an expert and reliable scientific resources.
D	Gives evidence that your problems / challenges to identify and put in context (department / organization / business environment, social environment) and can analyse these problems. You are able, where appropriate and relevant to search for multiple solutions.
E	Throughout the dissolution process you're curious, ask yourself if from different perspectives. You are pragmatically, creatively and critically and make if appropriate use of resources.

F	You can make a thoughtful and methodical choosing the correct / most appropriate / suitable solution or approach. While you are critical about your own basis and used arguments.

2.2.3 ***Programme structure*** (article 3.3 CER HZ)

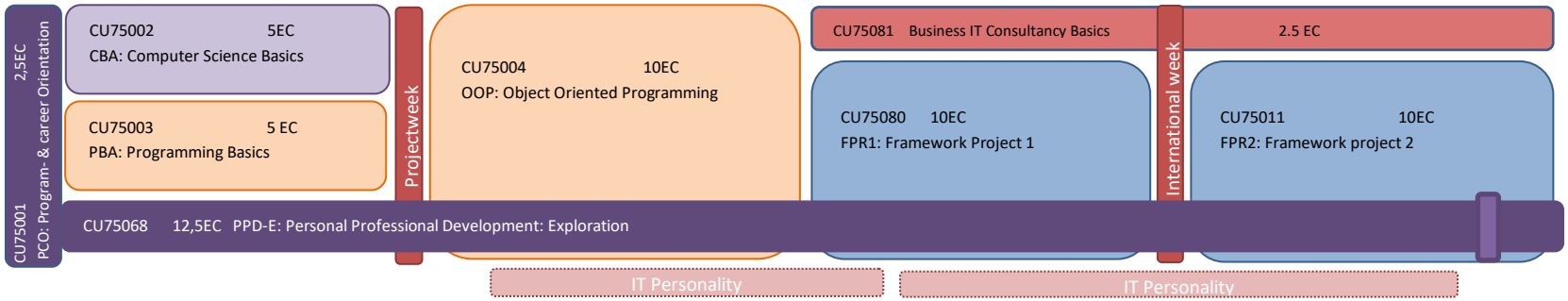
National name:	B HBO-ICT
International name:	B Information & Communication Technology
Orientation:	Bachelor
Title conferred:	Bachelor of Science
Programme duration:	240 study credits (ECTS)
Course workload 'propaedeutic' phase:	60 study credits (ECTS)
Conclusion with 'propaedeutic' examination:	Yes
Course workload main phase:	180 study credits (ECTS)
Variant:	Full-time
ISAT code:	30020
Location:	Middelburg
Language:	Dutch & English
Effective date:	29-06-2018
Submission date	01-11-2024
Joint degree programme:	Not applicable
180 ECTS fast track:	No

2.2.3a ***Programme schedule***

Course structure of the programme

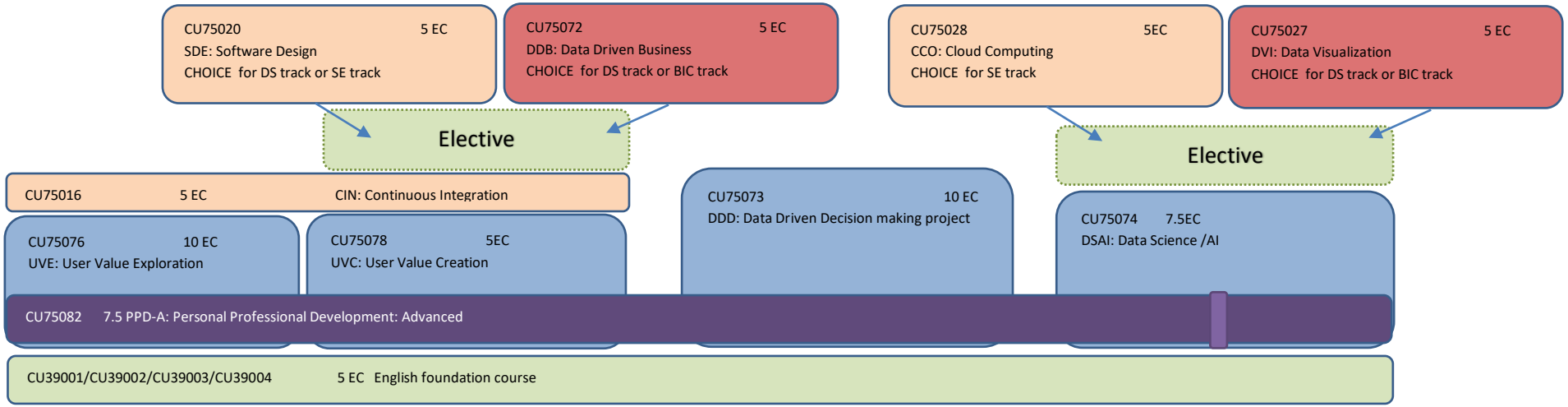
PROPAEDEUTIC PHASE (YEAR 1)

Personality 2.5 EC

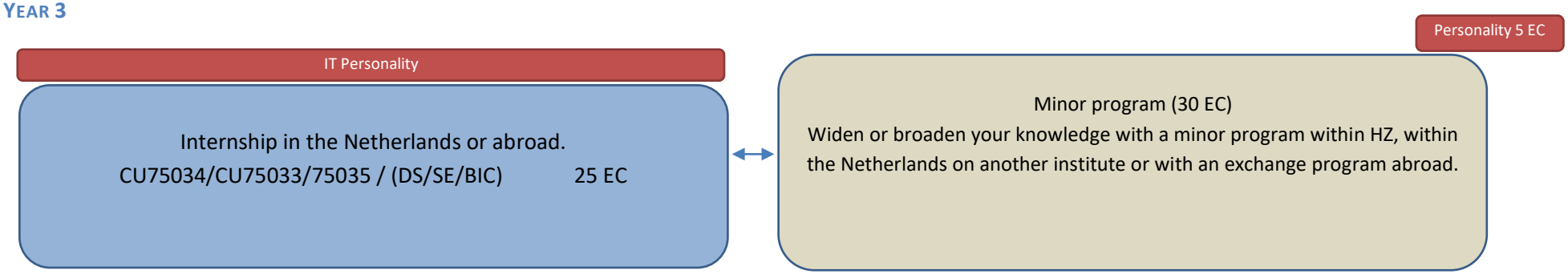


MAIN PHASE

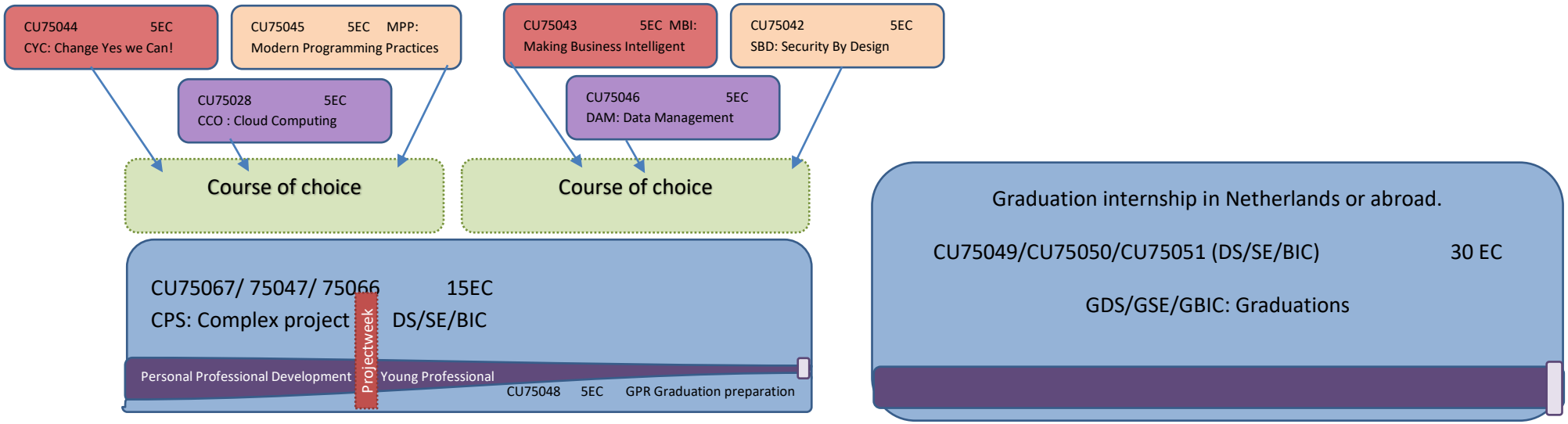
YEAR 2



YEAR 3


Personality 5 EC
IT Personality
Internship in the Netherlands or abroad.
CU75034/CU75033/75035 / (DS/SE/BIC) 25 EC
Minor program (30 EC)
Widen or broaden your knowledge with a minor program within HZ, within the Netherlands on another institute or with an exchange program abroad.

YEAR 4


CU75044 5EC
CYC: Change Yes we Can!
CU75045 5EC MPP:
Modern Programming Practices
CU75043 5EC MBI:
Making Business Intelligent
CU75042 5EC
SBD: Security By Design
CU75028 5EC
CCO : Cloud Computing
CU75046 5EC
DAM: Data Management
Course of choice
Course of choice
CU75067/ 75047/ 75066 15EC
CPS: Complex project DS/SE/BIC
Projectweek
Personal Professional Development
Young Professional
CU75048 5EC GPR Graduation preparation
Graduation internship in Netherlands or abroad.
CU75049/CU75050/CU75051 (DS/SE/BIC) 30 EC
GDS/GSE/GBIC: Graduations

2.2.3b ***Transfer with an associate degree certificate*** (article 3.3 CER HZ)
This article is specifically written in Dutch because AD students can only choose the Dutch track.

Toelating van studenten met een Ad getuigschrift: Studenten met een getuigschrift Ad Informatica (Isat80075) uitgereikt door Avans Hogeschool (Brin 07GR), vestigingsplaats Roosendaal, zijn direct toelaatbaar. Tevens mogen deze studenten zich in het eerste jaar van inschrijving inschrijven voor de postpropedeutische fase van de opleiding. Het instellingsbestuur verleent hen daartoe vrijstelling van de eis in het bezit te zijn van een getuigschrift van het met goed gevolg afgelegde propedeutisch examen (via WHW art. 7.30 lid 2). De examencommissie verleent studenten met dit getuigschrift op individuele basis vrijstelling voor het afleggen van de tentamens waarvan de examencommissie voorafgaande aan het eerste jaar van inschrijven aan de hand van een programmavergelijking heeft kunnen vaststellen dat de student beschikt over de kennis, inzicht en vaardigheden op het niveau waarnaar via die tentamens onderzoek gedaan wordt. De studenten dienen daartoe conform OER (Bachelor en Experiment Leeruitkomsten) artikel 4.6 en artikel 4.5 OER (Associate Degrees) om die vrijstellingen te verzoeken. Het voorgaande geldt niet voor studenten met een getuigschrift Ad Informatica uitgereikt door andere hogescholen dan genoemde en ook niet voor studenten met een Ad getuigschrift van een andere opleiding dan Ad Informatica.

2.2.3c ***The study program follows specific rules regarding language, which are explained below.***

Determine the level of English

At the beginning of the first year, all first-year students will take a placement test to determine whether they will join the B2 or C1 class at the Language Competence Centre (LCC). The LCC will provide the entire course, including tests. Additionally, students can choose to sign up for the C2 level to achieve proficiency. Students can also apply individually for an official Cambridge test, which they will need to pay for themselves. Any agreements can be made directly with the LCC.

Applying for exemption

Students who own a certificate that is no more than three years old and has at least a B score on a B2 certificate or a grade of 7 or higher on an IELTS test can apply for exemption. The LCC will advise on the intended exemption, which will be handled by the examination board and either granted or denied. The procedure will be managed by the LCC. If exemption is granted, the language test for PPD-E (CU75068 for INT and CU75079 for NL) will be considered passed.

General overview of used language in the program in year 1

Lessons and tests for the theoretical part will take place in two separate groups: Dutch and English. However, collective meetings, such as those with guest speakers, will be organized in English. Dutch students may voluntarily attend classes in English. All material will be in English. For ICT, much of the material is already in English, and the starting students' MBO/HAVO reading level in English is sufficient.

General overview of used language in the program in year 2

Lessons will generally take place in separate groups in both Dutch and English, with an exception for Design thinking within UVE (CU75076V2) and the two electives: Software Design (SDE CU75020V2) and Data-driven Business (CU75072V1), which will be taught in English. Written or

digital tests will take place in two separate groups: Dutch and English, with an exception for the aforementioned courses. All individual hand-in tests, such as portfolios or reports, will be delivered in either English or Dutch, depending on the student's project group.

Second semester of the second year and beyond:

The language of instruction and examination will be English for the second semester of the second year and the entire third and fourth years, except for the work placement/graduation phase, which will be in the language requested by the work placement company or where the student is completing their graduation. For cohorts up to and including 2019-2020, the language of instruction and examination is Dutch, except for the work placement/graduation phase, which will be in the language requested by the work placement company or where the student is completing their graduation.

Important note for 2022-2023 COHORT:
The students who have had their language test of PPD-E ticked off, do not need to follow the English foundation course in Year 2.

2.2.4 ***Courses propaedeutic phase*** (article 3.5 CER HZ)
See appendix 1.

2.2.5 ***Main phase courses*** (article 3.6 CER HZ)
See appendix 2.

2.2.6 ***HZ Personality*** (article 3.11 CER HZ)
Free composition space is included in the educational program of the ICT program. For the 2023-2024 cohort, this concerns a total of 7,25 ECTS, which is in conflict with the minimum of 10 credits art. 3.12 OER HZ. However, we as a programme consider the courses provided by LCC as personality improvement, and there for the 5 ECTS English which are mandatory, are replace 5 ECTS of Personality.

With this learning path, HZ offers students the opportunity to personalize their own development during their study time, it increases the possibilities to broaden domain-transcending domains and stimulates broad social involvement. The student is responsible for filling in these free credits; in consultation with the ITP coordinators of the study program, he/she makes a proposal for interpretation within the established frameworks. Free credits are included in a certain place in the study program (see study program schedules under 2.2.3), but a student is free to enter the free credits at any time. These ITP courses are conform the policy document HZ Personality.

2.2.7 ***Specialisations*** (article 3.9 CER HZ)

The HBO-ICT program offers 3 specific tracks. These are called study tracks. Each of these tracks consists of a compulsory part of a specific internship, a specific specialization semester and finally a specific graduation project. In addition, it is recommended to choose a matching minor. Specifically, it concerns the following tracks:

- Software engineering (SE)
- Data science (DS)

- Business IT consultancy (BIC)

Students choose between two of the three tracks in consultation with a lecturer/coach during year 2, block 5. The definite choice of one of these tracks will be during year 2, block 7. The study career coach is providing track specific information before the choice has to be made. Afterwards, the choice will be definitive for the rest of the program. Obviously, students may choose to switch during their studies. The impactions though, need to be discussed with the study career coach.

Even though the tracks are labelled as specialisations, the degree is still HBO-ICT croho and the chosen track is added to the degree ad an addendum, as well as the list of grades.

2.2.8 ***Internship*** (article 3.8 CER HZ)

It is mandatory students do their internship corresponding to their chosen track choice. Registering for a different internship will imply the student chooses for another track choice and thus needs to fulfil the applicable courses and finished track dependent courses will become extracurricular.

For information on the graduation/graduation internship, securing an internship and its assessment, please refer to the Graduation or internship course on learn which provide the student information and instruction.

2.2.9 ***Minor*** (article 3.7 CER HZ)

No additional requirements for advancement have been formulated for the minor.

If a student wishes to participate in a minor outside their own study program at a higher education institution or university in the Netherlands or abroad, prior permission from the partial examination board is required. The partial examination board checks whether the student has adequately justified the objectives and level of the minor to be chosen and whether the objectives and level of the minor to be chosen could not also be achieved by taking an HZ minor and whether the participation conditions are met as stated in article 3.8 CER HZ Ba ft.
Instructions:

- Name any additional requirements for participation in the minor. Otherwise, list any additions.
- Name in which semesters the minor can be taken within the program.
- A program need not include the description of content in this article of a minor it owns. Details are in the MyHZ info page.

2.2.10 ***Participation in international exchange programme*** (article 4.5 CER HZ)

The programme does participate in an international exchange programme.

Within the HBO-ICT program there are opportunities to gain international experience during the internship, the minor or the graduation (blocks 9 & 10, 11 & 12, 15 & 16).

2.2.11 ***Graduation*** (article 3.8 CER HZ)

In order to participate in the graduation phase of the HBO-ICT programme (semester 8), the student has to have no more than 12,5 ECTS unpassed, besides the 30 ECTS of the graduation phase. The actual graduation manual (learn page) is applicable for each student, starting a graduation.

For information on the graduation/graduation internship, securing an internship and its assessment, please refer to the Graduation or internship course on learn which provide the student information and instruction.

2.2.12 ***Assessments and inspection of results (article 6.1-6.7 CER HZ)***

HZ uses seven assessment types that are defined in the HZ Assessment Policy, namely:

- *Written knowledge test*; set of questions focused on knowledge reproduction and/or knowledge application, which are answered in writing.
- *Oral assessment*; set of questions about knowledge (application), which are answered orally.
- *Assignment*; representation of a performed (professional) task.
- *Presentation*; explanation or explanation before an audience of a performed (professional) task.
- *Portfolio*; collection of evidence of competence provided by the student.
- *Criterion-referenced interview*; discussion between assessor and student based on evidence provided in advance, using predefined criteria.
- *(Workplace) Assessment*; performance of (professional) tasks and/or skills (in an authentic context).

The Examination Board's fraud regulations and testing protocols apply to the taking of tests, see MyHZ.

The examiner ensures that the result of a test is registered in Osiris student (article 6.6 of the CER HZ) within 10 working days after the student has taken the test and at least 5 working days before the next possibility for resit.

The student has the right to inspect the assignments/questions, their elaborations and the assessment criteria of the test taken by the student within 10 working days after the date on which the result of the test was announced, or as much earlier as is necessary in connection with the next possibility of resitting the test (article 6.4 and article 6.6 of the CER HZ).

2.2.13 ***Transition arrangement*** (article 6.7 CER HZ)

Transition since 2022-2023, tests are offered for resits, for one more year during 2023-2024. After this period the possibility for resits for these course will expire. Additionally, student to whom the changes apply, are serviced personally.

Changes to the curriculum

1. CU75076V2: Test 3 removed. Involved learning outcomes are covered by Test 1 of the same course

2. CU75068, CU75079 & CU75069: English has been removed from PPD and is now covered in an autonomous course provided by the Language & Culture Centre (see 2.2.3c)
3. CU75079: Dutch (*Hogeschool taal toets)* is removed from the program therefor Learning Outcome 7.3F is removed.
4. CU75008: FDE1 has been merged with Framework Project 1
5. CU75043: MBI has been enriched with a learning outcome (2.1L)
6. CU75081: BICB, a new course added to the Propaedeutic phase.

In the table below the transition if needed for the above mentioned changed, are explained.

Old					**New**
Course name	**Short**	**ECTS**	**CU**	**Version**	**Note**
Personal Professional Development: Exploration	PPD-E	12.5	75068 75079	2 1	English covered by (*see 2.2.3c*)
Personal Professional Development: Advanced	PPD-A	8.75	75069	2	English covered by (*see 2.2.3c*) Changed to 7.5 ECTS
User Value Exploration	UVE	10	75076	1	4.3S, 4.2U, 4.2W, V1 is replaced by V2
Framework Development 1	FDE1	5	75008	1	Tested by CU75080V1 (FPR1) -> Test 1
Framework Project 1	FPR1	7.5	75009	3	Completely replaced by FPR1 (CU75080V1)
Making Business Intelligent	MBI	5	75043	1	V1 is replaced by V2
Change You Can	CYC	5	75044	1	Fixed learning outcome
Personality	ITP	-	-	-	See the known Personality Learn page

Table 3: transition of changes

2.3 Study recommendation

2.3.1. ***Conditions for registration for programme after NBSA*** (article 8.1, paragraph 9 HZ CER)
Students who receive a negative binding study advice for the bachelor HBO-ICT at HZ University of Applied Sciences cannot register for the bachelor program HBO-ICT within three years at HZ University of Applied Sciences.

2.4 Registering for courses and tests

2.4.1 The student registers for **courses** through OSIRIS Student (CER HZ article 4.4 paragraph 3).

- The student will be informed about course registration by email no later than 2 weeks before the start of the study year.
- New students will be registered by the study programme for the courses of block 1 in their first year at HZ.
- To participate in the course, you must be enrolled no later than one week before the start.
- Once the student is enrolled, the student will also see this in the timetable.
- If a student decides not to take a course, the student contacts the SLC early.

2.4.2 Students register and de-register for tests through OSIRIS Student. Registration applies to all types of tests and all tests within a course. HZ works with registering for tests so that courses can organize the work for taking and assessing tests (OER article 6.3 paragraph 1).

- Students are informed centrally in week 1 of each block via an email by the domain offices about registering for tests.
- New students are enrolled by the program for the first two test occasions or guided therein by the program for tests of block 1 year 1.
- Students must register for all tests in the block in which the tests are offered no later than the second week of classes (Sunday 23:59h, GMT+1). With registration before the deadline, the student is guaranteed to participate in the tests.
- After registering, the student may decide not to take the test after all. In that case, the student deregisters himself/herself in OSIRIS Student again for the test opportunity. This can be done at any time, except if the student has participated in the test. *Note! A student is entitled to two test attempts per academic year, unless the examination committee decides otherwise (CER article 6.2). Articles 2.2.4 and 2.2.5 of the Implementation Regulations state for each test how many test opportunities are offered in the academic year.*
- If a student has not registered before the deadline for a test opportunity in which the student does want to participate, the student contacts the study coach (SLC)
- The student checks in week 6 of each block whether the test opportunity is in the timetable. If, after registration, the test is not in the timetable, the student contacts the domain office.
- When a student is registered for a test and has not participated, Not Participated (NP) is entered as a result in OSIRIS.

2.4.3 More information about OSIRIS Student can be found on HZ Learn under Student - OSIRIS Support.

CHAPTER 3 ESTABLISHMENT

3.1.1 The duration of the implementation regulations is the same as the duration of the HZ Course and Examination Regulations Bachelor programme full-time 2023-2024.

3.1.2 The study program committee has approved this implementation regulation on 28/04/2023.

3.1.3 These Course and Examination Regulations were established by the Executive Board on 18/07/2023.

Appendix 1 – Course propaedeutic phase

Block 1 / Semester: S1					
CU75001V3	**Title: Program- & Career Orientation**				
Course information					
Amount of study credits: 2.5			**Language:** English **&** Dutch		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Students are introduced to each other, the teachers, the programme and their career opportunities. Based on this knowledge the students can, supported by examples and/or reflections, draw some conclusions for the rest of their own study. Students will start with hands on practice.					
Course learning outcomes: You can create a website as introduction to the program, include your motivation and show that you improve the website based on received feedback. Leading to a website that is improved in quality and attractiveness [B1]					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Individual process assessment	Assessment website	100%	5.5	S1.5, S1.6 & S1.10

Block 1 / Semester: S1					
CU75002V2	**Title: Computer Science Basics**				
Course information					
Amount of study credits: 5			**Language:** Dutch **&** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Fundamental computer science concepts including definition, history, and working of computers; compilers; data structures; operating systems; and client-server architecture.					
Course learning outcomes: 5.1A: you describe the foundations of a computer system					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Tentamen	Written exam	100%	5.5	S1.10 & S1.15

Block 1 / Semester: S1					
CU75003V1	**Title: Programming Basics**				
Course information					
Amount of study credits: 5			**Language:** English **&** Dutch		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Your first steps into programming. You learn subjects as: data structures conditionals, loops, functions problem solving and algorithmic thinking.					
Course learning outcomes: 4.3G: you apply programming concepts to realise functionality (Miller: 1. prescriptive, 2. applying) 4.3H: you write readable, well-organized code (Miller: 1. prescriptive, 2. applying) 4.3I: you make robust code (Miller: 1. prescriptive, 2. applying)					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Case test (written knowledge test)	Case study exam	100%	5.5	S1.10 & S1.15

Block 2 / Semester: S1					
CU75004V1	**Title: Object-Oriented Programming**				
Course information					
Amount of study credits: 10			**Language:** English **&** Dutch		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: You apply the object-oriented principles: abstraction, encapsulation, inheritance and polymorphism. First, we cover the theory then we move on to a practical assignment for a regional client.					
Course learning outcomes: **Test 1:** 4.1F: you collect information so as to formulate functional requirements for a system to be developed according to a standard method 4.2E: you write a technical description of (the internal) structure and working of an Object Oriented information system. 4.3F: you apply Object Oriented programming concepts to realise functionality. 4.3G: you apply programming concepts to realise functionality (Miller: 1. prescriptive, 2. applying) 4.3H: you write readable, well-organized code (Miller: 1. prescriptive, 2. applying) 4.3I: you make robust code (Miller: 1. prescriptive, 2. applying) **Test 2:** 4.3F: you apply Object Oriented programming concepts to realise functionality. 4.3G: you apply programming concepts to realise functionality (Miller: 1. prescriptive, 2. applying) 4.3H: you write readable, well-organized code (Miller: 1. prescriptive, 2. applying) 4.3I: you make robust code (Miller: 1. prescriptive, 2. applying)					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Presentation (individual)	Group assignment	50%	5.5	S1.15 & S1.20
TOETS02 (VT)	Written knowledge test	Case study exam	50%	5.5	S1.20 & S2.3

Block 1 / Semester: S2	
CU75080V1	**Title: Framework project 1**
Course information	
Amount of study credits: 10	**Language:** Dutch **AND** English
Conditions for course participation: none	
Conditions for test participation: none	
Brief description of course content: *The student learns the basic principles of a specific framework. The student will learn to apply that framework in a project. Requirement analysis (identify requirements and wishes) and software-development process. Students work in groups on real life SDG related cases within given frameworks.*	
Course learning outcomes: **Test 1:** 1.3A: You can apply design guidelines and corporate branding when realising a simple interaction within an information system 4.2B: You can make a functional design of a simple function of a system yet to be developed, and document it through a standard modelling technique. 4.2C: You can make a technical design of a simple function of a system as yet to be developed, and document it be means of a standard modelling technique 4.3A: You can realise a simple function within given concepts of a Framework **Test 2:** 1.3B: You can realise a simple interaction within a team while taking into account consistency and standards 4.5A: You can organize and use tools to exchange code and documentation within a team 4.2A: you design a database of a simple information system and document this by means a standard modelling technique 4.5C: You can set up an environment on your working environment using virtualization and use it to test code. 4.3B: You can test a software system based on a Framework on the own work environment **Test 3:** 2.1A: map, according to the given methodology, the current situation of a singular company process (IST) 2.2A: describe, according to a given methodology, a design for an improved company process through ICT (soll) 4.1A: you determine the systems context of a system to be developed 4.1B: you collect relevant data from one single requirement's source through a given elicitation technique 4.1C: you interpret collected data from the functional perspective to formulate and document requirements according to given standard method in natural language **Test 4:** 4.2A: you design a database of a simple information system and document this by means a standard modelling technique	
Compulsory literature: none	

Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Written knowledge test	On-site case study exam	50%	5.5	S2.5 & S2.10
TOETS02 (VT)	Written knowledge test	Database exam	12%	5.5	S2.7 & S2.10
TOETS03 (VT)	Assignment (group)	Group presentation on project result	25%	5.5	S2.10 & S2.12
TOETS04 (VT)	Assignment (individual)	Group portfolio with individual elements on requirements	12%	5.5	S2.9 & S2.12

Block 2 / Semester: S2	
CU75011V3	**Title: Framework Project 2**
Course information	
Amount of study credits: 10	**Language:** Dutch **&** English
Conditions for course participation: none	
Conditions for test participation: none	
Brief description of course content: The course focuses on the application of the prior gained knowledge about human-machine interaction principles and advanced framework principles. The students learns to study more advanced concepts of a given framework, like the connection of information from more (then one) tables, the use of notifications and other innovations that suits the project (each group defines their own sprint goals). Student work on a real life project related to the SDG's. Students will deliver their final product to the client and will work on acceptation tests on their products. Student can apply a variation of certain IT developments and techniques to their project. In this way students can choose (in addition to a general basis) their own personalized theme to deepen or broaden.	
Course learning outcomes: **Test 1:** 1.3C: You can help a user with preventing, recognising and solving erroneous actions in a consistent manner within a team 1.3D: You can help a user with recognising and solving erroneous actions 4.5E: you use containerization to make an application available and modify it **Test 2:** 4.1D: develop acceptation criteria for a user story 4.1E: you determine the System and the Systems context for a system to be developed with one interested party 4.1G: you document functional requirements for a system to be developed in natural language and in models through a given standard method 4.2D: you communicate more complex concepts and designs univocally with the professional field 4.5B: Use the project tools to improve the process of analysis, design, realization, testing and making functions available in an application 4.5D: you set up (generic) servers to make an application available **Test 3:** 1.3E: You can apply standards and internal consistency when developing more complex functions within an application 3.3A: Make available a software system based on a Framework for users in a simple hosting environment 4.3C: Deliver Code that is acceptable for a production environment 4.3D: Within a given framework context apply a more complex concept 4.3E: Within a given organization and framework context develop an innovation	
Compulsory literature: none	

Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Final delivery	25%	5.5	S2.19 & S2.20
TOETS02 (VT)	Portfolio	Report of acceptance tests and optional assessments	25%	5.5	S2.19 to S2.20
TOETS03 (VT)	Portfolio	IT Development portfolio	50%	5.5	S2.19 & S2.20

Block 1&2 / Semester: S2					
CU75081V1	**Title: Business IT Consultancy basics**				
Course information					
Amount of study credits: 2.5			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: The aim of these learning objectives and content is to introduce first-year IT students to the role of a business IT consultant and provide them with fundamental skills and concepts necessary for success in this role. By offering both theoretical knowledge and practical application, students can gain a better understanding of the work of a business IT consultant and develop their own skills in this field.					
Course learning outcomes: 2.1M: Acquire practical skills for conducting an IT consultancy project					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Assignment (individual)	Video	100%	5.5	S2.19 & S2.20

Block 1&2 / Semester: S1 & Block 1&2 / Semester: S2	
CU75068V3	**Title: Personal Professional Development Exploration**
Course information	
Amount of study credits: 12.5	**Language:** English **AND** Dutch
Conditions for course participation: none	
Conditions for test participation: none	

Brief description of course content:

General Bachelor-competences, in this case: aspects of written reporting like language provision, style, typography, house style, further layout and referencing. Reporting skills are applied on the subject of game development and combined with further guidance on development as an (international) ICT student on this program. The feedback based improvement can be demonstrated in the second reading and writing assignment. General bachelor competences in Agile working project groups (by retrospective feedback or self study). In this case: self-steering and (team)learning, methodical judgment, communicational behaviour in project groups.

Course learning outcomes:

7.2O: You're considerate, see opportunities and seize them. You have a proactive attitude that you take initiative and feel responsible for what you do
7.2P: You can motivate yourself and others, you are willing to help others / support (individual and team). You can present yourself or a team, take others into your own development.
7.2Q:You study demonstrates considered, strengthens your own learning and can recognize a learning need in yourself and mating act, reflect, evaluate, and give active feedback questions. You recognize when you need help and do it then.
7.2R: You can specify what type of professional you want to be and / or what type of positions you aspire, know your own strengths and weaknesses and can describe yourself well

7.3C: You focus on the various groups of stakeholders such as partners, interest groups, individual team members etc.
7.3D: You focus on what you want to communicate and what purpose you choose the most appropriate form and while you perform this proactively
7.3E: You focus on your role in the context of the ICT job, you recognize these tasks and takes proactive. You dare others to speak (feedback) and is open to feedback. You are open to other opinions / views / arguments and see that as an enrichment. You consciously builds confidence in an interdisciplinary and intercultural cooperation contex

7.4L: Gives evidence that you are able to think ahead and plan ahead. You think methodically about the approach suitable for the assignment (identification of tasks, order of execution, proper prioritization) and how this contributes to the end result.
7.4M:You plan and monitors the time. You are cost conscious. You recognize opportunities and risks. You can thereby all time aware of agreements, legal regulations and ethical standards
7.4N: You have a keen eye for the feasibility of duties in the organization. You taking into account the characteristics of the area of the assignment.
7.4O: You examine where necessary and relevant to the ethical implications of the tasks you perform. You recognize their own and others' limits and act accordingly
7.4P: You can construct achievable and realistic goals within the time available which contribute to solving a problem or achieving a demand. The goals can be divided into multiple related detailed tasks

7.5D: Gives evidence that your problems / challenges to identify and put in context (department / organization / business environment, social environment) and can analyse these problems. You are able, where appropriate and relevant to search for multiple solutions.
7.5E:Throughout the dissolution process you're curious, ask yourself if from different perspectives. You are pragmatically, creatively and critically and make if appropriate use of resources
7.5F:You can make a thoughtful and methodical choosing the correct / most appropriate / suitable solution or approach. While you are critical about your own basis and used arguments.

Compulsory literature: none

Assessment information

Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Criterion-referenced assessment	Criterium focused interview	100%	5.5	S2.11 to S2.14

CU75054V1	**Title: IT Personality- projectweek 1**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: This course can be followed 3 times during the study programme. Course description for CU75054, CU75058, and CU75075 are identical. IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. Each year the ICT program organizes a project week with real life casus and (if possible) in cooperation with other programs. This project week course can be chosen as 1,25 ec content for personality. The assessment criteria and assessment process are listed in the IT Personality 2021-2022 instruction manual which can be found on the Learn page. This course is already approved for IT personality, students only need to define their personal goals within the given context.					
Course learning outcomes: 7.2M: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals through participation in a project week.					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[4]	See learn

CU75055V1	**Title: IT Personality International week**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. Each year the ICT program organizes an international week. If possible including a visit in an international city. This international week course can be chosen as 1,25 ec content for personality. The assessment criteria and assessment process are listed in the IT Personality 2021-2022 instruction manual which can be found on the Learn page. This course is already approved for IT personality, students only need to define their personal goals within the given context.					
Course learning outcomes: 7.2N: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to personal goals through participation in an international week.					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[5]	See learn

[4] P/NP stands for Passed/Not Passed.
[5] P/NP stands for Passed/Not Passed.

CU75056V1	**Title: IT Personality 1**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2M: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals through participation in a project week.					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[6]	See learn

CU75057V1	**Title: IT Personality 2**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2L:Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals.					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[7]	See learn

[6] P/NP stands for Passed/Not Passed.
[7] P/NP stands for Passed/Not Passed.

Appendix 2 – Course main phase

2nd YEAR

Block 1 / Semester: S1					
CU75076V2	**Title: User Value Exploration**				
Course information					
Amount of study credits: 10			**Language:** English **AND** Dutch		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: User centred focus on exploring a problem context, setting up an architecture and understanding the user.					
Course learning outcomes: **Test 1:** 1.1B: You describe the important consequences for UX based on a target group analysis 1.2B: You describe UX test strategies suitable for a given situation 1.3K: You describe the correct implementation of UX design choices 4.2J: you describe the needs of the users of the software system to be developed 4.2N: you write a techspecs report as a reference that can be transferred to third parties 4.2U: You can create measurable non-functional requirements for a given system 4.2V: You can design a substantiated architecture of a software system 4.2W: You can derive and interpret performance metrics for a given system 4.3S: You can implement a component for a given architecture **Test 2:** 4.1T: You develop empathy for stakeholders to determine their challenges 4.1U: You create innovative ideas based on a defined problem 4.1V: You develop a prototype based on a validated idea 4.1W: You test the prototype extensively to come up with new insights					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Written knowledge test	Individual written test	50%	5.5	S1.5 & S1.7
TOETS02 (VT)	Assignment (individual)	Book test and assessment	50%	5.5	S1.8 & S1.10

Block 2 / Semester: S1					
CU75078V1	**Title: User Value Creation**				
Course information					
Amount of study credits: 5			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: User centred approach on creating a solution for a complex problem.					
Course learning outcomes: 1.1B: You describe the important consequences for UX based on a target group analysis 1.3L: You write a UX report accounting for design choices based on guidelines, human factors and/or emotional design 1.3M: You test the UX of a product in a UX test report to evaluate the quality 1.3N: You recommend further development steps based on the UX test report 4.2J: you describe the needs of the users of the software system to be developed 4.2K: you draw up a functional design for a complex part of a software system 4.2N: you write a techspecs report as reference that can be transferred to third parties 4.3S: You can implement a component for a given architecture					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Criterion-referenced assessment	Group assessment based on products in a portfolio	100%	5.5	S1.19 & S1.20

Block 1 & 2/ Semester: S1					
CU75016V2	**Title: Continuous integration**				
Course information					
Amount of study credits: 5			**Language:** English **&** Dutch		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Develop a thorough understanding of a version control system (VCS) and learn strategies to incorporate a VCS in effective team collaboration. Setup a complete CI pipeline with an automated build for a given project. Add tests and metric tools like code coverage to control the software quality. Course will be based on several deliverables. The course planning is based on different types of releases. Improved by feedback each deliverable will be part of the final portfolio.					
Course learning outcomes: 4.5F: Master the advanced features of the distributed version control system (DVCS) Git to enable effective collaboration on a software project 4.5G: Achieve manageability of your software project releases by choosing a branching model and corresponding workflow 4.5H: Design a deployment pipeline that runs an existing open source software application and generates an automatic build 4.5I: Proof your solution by performing a complete release from a change in code that generates corresponding executables executing all the steps of a release management cycle 4.5J: Guarantee software quality by enabling quality tools and executing unit tests					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	40%	5.5	S1.5 & S1.9
TOETS02 (VT)	Criterion-referenced assessment	Assessment	60%	5.5	S1.18 & S1.19

Block 2 / Semester: S1					
CU75020V2	**Title: Software Design (*Elective*)**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Make software robust! Learn how to detect weak spots in programming code (code smells) and how to solve them (refactoring) with proven solutions like design patterns. Student will learn to Detect design patterns with a tool in an open source software system and will report the result (including class diagram) in a short report. Student will learn to apply refactoring in an open source software system and report their findings and opinion in a blog. Students will Create in pairs a working program that houses multiple design patterns.					
Course learning outcomes: **Test 1:** 4.3J: Indicate for a given code example/class diagram which design patterns were applied **Test 2:** 4.3L: Recognise weak points in code, so-called code smells, and apply an appropriate standardised remedy, so-called refactoring **Test 3:** 4.3K: Apply a suitable design pattern for a given situation and work it out in both a class diagram and actual code					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Assignment (individual)	Report	30%	5.5	S1.16 & S1.20
TOETS02 (VT)	Assignment (individual)	Blog	30%	5.5	S1.16 & S1.20
TOETS03 (VT)	Assignment (individual)	Program	40%	5.5	S1.18 & S1.20

Block 2/ Semester: S1					
CU75072V1	**Title: Data Driven Business (*Elective*)**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Introduction in "how to become a data driven organization". Students will learn the definition of Data Driven business and why companies want or need to change their business. Students are given tools to determine which companies are data driven. Furthermore they will have understanding in what is needed for companies to become data driven. Additionally, from a maturity point of view, students will be introduced to an exemplary roadmap in which a company may become data driven. In addition, students are given insight in flaws, failures & don'ts of becoming data driven. All aspects of the courses will be backed by real-life cases, so far as possible. Lastly the connection to Data Strategy will be explained, to ensure students understand what the end-goals may look like in a broader overview. Students will work in groups of 3 or 4 (depends on the number of students starting the course).					
Course learning outcomes: 2.1K: You are capable of understanding the need for business to embrace data and can report what their maturity in this field is 2.4E: You understand how a company's data maturity fits in a broader context of data strategy 2.4F: You can advise about the future perspective of data driven business.					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Assignment (individual)	Report	50%	5.5	S1.18 & S1.20
TOETS02 (VT)	Presentation (individual)	Presentation	50%	5.5	S1.19 & S1.20

Block 1 / Semester: S2	
CU75073V1	**Title: Data Driven Decision making**
Course information	
Amount of study credits: 10	**Language:** English
Conditions for course participation: none	
Conditions for test participation: none	

Brief description of course content:

Getting acquainted with the iterative Data Science process, in which all the stages of the cycle are completed. The emphasis is on creating insight, based on data, for complex issues. Student work in teams with CRISP-DM methodology on a Data Science project in mixed NL and ENG groups.
Student still work in sprints but follow the steps of CRISP-DM. Python classes are introduced to educate the much needed skill set in data science projects. Deliverables are delivered to the client in a demo and the steps are evaluated. Deliverables are delivered in a professional portfolio.
The first steps are business and data understanding. Therefor students analyse the organisation including organisational processes using standardised methods. Organisational analysis and the first phases of CRISP-DM are combined end the deliverables are delivered in a professional portfolio. Further students learn to be able to view systems, data and IT solutions from a security perspective. Estimating the impact of data, software and IT related developments on society from an ethical perspective and elaborate about different points of view.

Course learning outcomes:

Test 1:
2.1B: analyse the performance of an organization through a standard methodology
2.1C: map an organization process of an existing organization by using suitable methodologies
2.1D: you assess a given situation on various security aspects
2.1I: you map the branch and the company and you analyse how that process contributes to the company's goals
2.4A: you submit a sound analysis report based on a company organization analysis
6.1A: You can define and report the customers organisation and its problem
6.1B: You can define & provide data mining goals
6.1C: You can define business objectives and are aware of the need of information by the business
6.1D: You can collect provided data sets and make them usable for the data science process
6.1E: You describe collected and needed data by data types and metadata

Test 2:
6.2A: You generate basic statistics summaries exploring data
6.2B: You create a basic quality description to validate relevant data
6.2C: You will exclude/include rows & columns to select relevant data
6.2D: You clean data in order to achieve correct data types and handle missing values
6.2E: You will perform basic feature extraction to construct correct and usable data
6.2F: You are capable of converting data in correct formats to visualize data
6.3A: You define metrics, independent records, & targets to generate a test design
6.3B: You build the model and benchmark the predictions with basic statistic tooling
6.3C: You assess relevant model(s) by the chosen metric
6.4A: You summarise and evaluate results with business objective(s)
6.4B: You set up a list of actions to determine following steps
6.4C: You produce a final report and present this to customer
6.4D: You review the data science process and you determine, and also report, lessons learned
7.3Q: as a team you can communicate your research in an organized way, appropriate for the audience
7.3P: Students can present their project, the content of their portfolio and their process considerations in a sound way making plausible the equal contribution of each project member to the project
7.3R: Students are able to deliver a solid product demonstration to the stakeholders in which they demonstrate the product and address the main challenges and present a realistic roadmap.
4.5K: you ensure confidentiality of a data set by applying cryptography

Test 3
7.2D: you form an ethical opinion on a security-related case, taking into account the opinions of people who may think

differently					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	30%	5.5	S2.6 or S2.8 & S2.10
TOETS02 (VT)	Criterion-referenced assessment	Criteria focused interview	45%	5.5	S2.9 or S2.10 & S2.10
TOETS03 (VT)	Presentation (individual)	Presentation	25%	5.5	S2.4 or S2.5 & S2.10

Block 2 / Semester: S2	
CU75074V1	**Title: Data Science/AI**
Course information	
Amount of study credits: 7.5	**Language:** English
Conditions for course participation: none	
Conditions for test participation: none	
Brief description of course content: Getting acquainted with the iterative Data Science process, in which all the stages of the cycle are completed. The emphasis is on creating insight, based on data, for complex issues. Student work in teams with CRISP-DM methodology on a Data Science project in mixed NL and ENG groups. Student still work in sprints but follow the steps of CRISP-DM. Python classes are introduced to educate the much needed skill set in data science projects. Deliverables are delivered to the client in a demo and the steps are evaluated. Deliverables are delivered in a professional portfolio. The first steps are business and data understanding. Therefor students analyse the organisation including organisational processes using standardised methods. Organisational analysis and the first phases of CRISP-DM are combined and the deliverables are delivered in a professional portfolio. Further students learn to be able to view systems, data and IT solutions from a security perspective. Estimating the impact of data, software and IT related developments on society from an ethical perspective and elaborate about different points of view.	
Course learning outcomes: **Test 1:** 6.1F: You define data mining goals success criteria 6.1G:You describe data mining activities based on choice of a basic machine learning model and relevant required activities 6.1H: You add extra self-organised and/or external data sources to the data science process 6.2G:You (re-)validate data after model generated assumptions 6.2H:You clean data by imputating and scaling relevant data 6.2I: You construct data by one-hot-encoding, defining targets & labelling relevant data 6.2J:You integrate relevant data by merging multiple data sources 6.2K:You convert data formats as prerequisite for relevant model(s) 6.3D: You split data into test & train sets to generate a test design 6.3E:You build & train relevant model(s) and create predictions using the model(s) on test data set 6.3F:You assess the model(s) on chosen metrics of the defined success criteria 6.4E:You evaluate and match success criteria with business objectives of the data science process 6.4F:You determine next steps and setup an advisory report for follow-up 6.4G:You produce a deliverable for customer 6.4H:You review the data science process and collect lessons learned on process & product 7.3Q: as a team you can communicate your research in an organized way, appropriate for the audience. 7.3P: Students can present their project, the content of their portfolio and their process considerations in a sound way making plausible the equal contribution of each project member to the project **Test 2:** 7.3R: Students are able to deliver a solid product demonstration to the stakeholders in which they demonstrate the product and address the main challenges and present a realistic roadmap	
Compulsory literature: none	

Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Criterion-referenced assessment	Criterium focused interview	80%	5.5	S2.18 & S2.20
TOETS02 (VT)	Presentation (individual)	Presentation	20%	5.5	S2.18 & S2.20

Block 2 / Semester: S2					
CU75027V3	**Title: Data Visualisation (*Elective*)**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation:					
Conditions for test participation:					
Brief description of course content: Creating a suitable data visualization for communicating information to a client. You will learn about data visualization goals, types and characteristics and how to research the best choices for your specific case. To conclude your research, you will create an actual data visualization (proof of concept). Course DVI is mandatory for study track Business IT Consultant. Course CCO is mandatory for study track Software Engineer. Course CCO & DVI are mandatory for study track Data Science. DVI will take place in year 2 and CCO in year 4.					
Course learning outcomes: 1.4A: You can draw up a datavision goal based on the project context and business goal taking into account the goal, the target group and the message 1.4B: You can make a sound choice for a datavisualisation type suitable for the datavisualisation goal 1.4C: You can make a sound choice for visual elements suitable for the datavisualisation goal 1.4D: You can realise a datavisualisation based on sound research					
Compulsory literature:					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio with optional assessment	100%	5.5	S2.18 & S2.20

Block 1 / Semester: S1 & Block 2 / Semester: S2					
CU75028V2	**Title: Cloud computing (*Elective*)**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Use cloud specific building blocks like serverless functions and different kinds of cloud storage, learn how to connect and monitor them, to let your project scale on a new level. Course DVI is mandatory for study track Business IT Consultant. Course CCO is mandatory for study track Software Engineer. Course CCO & DVI are mandatory for study track Data Science. DVI will take place in year 2 and CCO in year 4.					
Course learning outcomes: 3.3A: Make available a software system based on a Framework for users in a simple hosting environment 3.4A: The student can advise for a given project how it should be adapted to be able to use the functionalities of a cloud provider 3.5A: The student can select and employ and react accordingly to the generated metrics for cloud application control tools.					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Assignment (individual)	Research proposal	40%	5.5	S2.14 or S2.15 & S2.20
TOETS02 (VT)	Assignment (individual)	Research report and proof of concept	60%	5.5	S2.18 or S2.19 & S2.20

Block 1&2 / Semester: S1 & Block 1&2 / Semester: S2	
CU75082V1	**Title: Personal Professional Development Advanced**
Course information	
Amount of study credits: 7.5	**Language:** Dutch **AND** English
Conditions for course participation: none	
Conditions for test participation: none	

Brief description of course content:

General bachelor competences in Agile working project groups and via CRISP-DM working project groups(by retrospective feedback or self study). In this case: working in a planned manner, showing and coordinating appropriate efforts, motivated cooperation, team-oriented and self-managing actions, self-directed (team) learning, methodical judgments, communicative behaviour in a project context. Project management: the student learns the relationship of project management (PM) to software development and concrete project management methods and methodologies are treated, such as SCRUM Project management. Students apply their PM skills during the projects and show what they have learned by showing deliverables and approving these deliverables by peer-feedback. Students learn to communicate effectively English in an IT project environment. During the English semester students can practice, receive feedback and need to demonstrate a sufficient level of reading, understanding, writing and presentation skills for practical professional situations.

Course learning outcomes:

Personal leadership

7.2O: You're considerate, see opportunities and seize them. You have a proactive attitude that you take initiative and feel responsible for what you do

7.2P: You can motivate yourself and others, you are willing to help others / support (individual and team). You can present yourself or a team, take others into your own development.

7.2Q: You study demonstrates considered, strengthens your own learning and can recognize a learning need in yourself and mating act, reflect, evaluate, and give active feedback questions. You recognize when you need help and do it then

7.2R: You can specify what type of professional you want to be and / or what type of positions you aspire, know your own strengths and weaknesses and can describe yourself well.

Interact purposefully

7.3C: You focus on the various groups of stakeholders such as partners, interest groups, individual team members etc

7.3D: You focus on what you want to communicate and what purpose you choose the most appropriate form and while you perform this proactively

7.3E: You focus on your role in the context of the ICT job, you recognize these tasks and takes proactive. You dare others to speak (feedback) and is open to feedback. You are open to other opinions / views / arguments and see that as an enrichment. You consciously builds confidence in an interdisciplinary and intercultural cooperation context.

Organise in a future-oriented way

7.4L: You give evidence that you are able to think ahead and plan ahead. You think methodically about the approach suitable for the assignment (identification of tasks, order of execution, proper prioritization) and how this contributes to the end result.

7.4M: You plan and monitors the time. You are cost conscious. You recognize opportunities and risks. You can thereby all time aware of agreements, legal regulations and ethical standards.

7.4N: You have a keen eye for the feasibility of duties in the organization. You taking into account the characteristics of the area of the assignment.

7.4O: You examine where necessary and relevant to the ethical implications of the tasks you perform. You recognize their own and others' limits and act accordingly

7.4P: You can construct achievable and realistic goals within the time available which contribute to solving a problem or achieving a demand. The goals can be divided into multiple related detailed tasks

Solve problems in a research-oriented way

7.5D: You provide evidence that your problems / challenges to identify and put in context (department / organization / business environment, social environment) and can analyse these problems. You are able, where appropriate and relevant to search for multiple solutions.

7.5E: You are curious Throughout the dissolution process, ask yourself if from different perspectives. You are pragmatically, creatively and critically and make if appropriate use of resources.

7.5F: You can make a thoughtful and methodical choosing the correct / most appropriate / suitable solution or approach. While you are critical about your own basis and used arguments.

Compulsory literature: none

Assessment information

Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Criterion-referenced assessment	Criterium focused interview	100%	5.5	S2.11 to S2.15

Semester: S1- S2	
EN39001	**Title: Foundation Course B1**
Course information	
Number of study credits: 5	**Language:** English
Conditions for course participation: -	
Conditions for test participation: -	

Brief description of course content:

Students can take the placement test and/or consult the LCC teacher before they decide for which English foundation course they will register. Course Level: A2/low B1 aiming at strong B1.

Learning Outcomes:

- ***Reading***. Ability to: understand emails/letters giving routine information or personal opinion; understand factual newspaper articles; understand the gist of theoretical academic articles on familiar topics.
- ***Writing***. Ability to: write emails/letters based on personal experience or familiar matters; make reasonably accurate notes from meetings and seminars on familiar topics; make basic notes in lectures.
- ***Listening***. Ability to: understand clear basic instructions; identify the main topic of a basic broadcast or lecture with some guidance; understand instructions on classes and assignments by lecturers.
- ***Speaking***. Ability to: express opinions on simple matters; ask for basic information; offer basic advice on familiar topics; take part in a seminar or meeting using simple language.

Based on CEFR. For more details see: https://learn.hz.nl/pluginfile.php/289968/mod_resource/content/0/CEFR-all-scales-and-all-skills.pdf

Learning outcomes:

Strong B-1 level

Compulsory literature:

Open World Preliminary: Student's Book with Answers with Online Practice, Niamh Humphreys; Susan Kingsley, 1e version, ISBN: 9783125405967, Costs: €37,00, Open World Preliminary: Student's Book with Answers with Online Practice

Assessment information

Tests code	**Assessment type**	**Content**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities**
TEST01 (VT)	Written knowledge test	Reading	25%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST02 (VT)	Written knowledge test	Writing	25%	5,5	B3.8; B4.8; B3.10; B4.10
TEST03 (VT)	Written knowledge test	Listening	25%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST04 (VT)	Assignment (group)	Speaking	25%	5,5	B4.8; B3.9; B4.9; B3.10; B4.10

Semester: S1 - S2	
EN39002	**Title: Foundation Course B2**
Course information	
Number of study credits: 5	**Language:** English
Conditions for course participation: -	
Conditions for test participation: -	

Brief description of course content:

Students can take the placement test and/or consult the LCC teacher before they decide for which English foundation course they will register. Course level: B1/low B2 aiming at strong B2.

Learning Outcomes:

- ***Reading/ Use of English.*** Ability to: scan texts for relevant information; understand the gist of information and articles on nonfamiliar topics and understand most of the content; apply and adapt language suitable for B2.
- ***Writing***. Ability to: express opinions and give reasons; write a simple piece of academic writing (e.g. a report) giving some evaluation, advice etc.; present arguments using a limited range of vocabulary and grammatical structures.
- ***Listening***. Ability to: follow a talk or lecture on a familiar topic; keep up with conversations on a wide range of topics; understand the answers to factual questions asked.
- ***Speaking***. Ability to: ask for clarification and further information; check for understanding; express opinions and arguments to a limited extent; answer predictable and factual questions.

Based on CEFR. For more details see: https://learn.hz.nl/pluginfile.php/289968/mod_resource/content/0/CEFR-all-scales-and-all-skills.pdf

Learning outcomes:

Strong B2 Level

Compulsory literature:

Open World B2, Anthony Cosgrove and Deborah Hobbs, 1e version, ISBN: 9783125406070, Costs: €40,80, Open World First: Student's Book with Answers with Online Practice

Assessment information

Tests code	**Assessment type**	**Content**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities**
TEST01 (VT)	Written knowledge test	Reading and Use of English	40%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST02 (VT)	Written knowledge test	Writing	20%	5,5	B3.8; B4.8; B3.10; B4.10
TEST03 (VT)	Written knowledge test	Listening	20%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST04 (VT)	Assignment (group)	Speaking	20%	5,5	B4.8; B3.9; B4.9; B3.10; B4.10

Semester: S1 - S2	
EN39003	**Title: Foundation Course C1**

Course information

Number of study credits: 5	**Language:** English

Conditions for course participation: -

Conditions for test participation: -

Brief description of course content:

Students can take the placement test and/or consult the LCC teacher before they decide for which English foundation course they will register. Course Level: B2/low C1 aiming at strong C1

Learning Outcomes:

- ***Reading/Use of English.*** Ability to: read quickly enough to cope with an academic course delivered in English; understand complex and arguments in lectures without serious misunderstandings; scan texts for relevant information and understand the gist of the text; apply and adapt language suitable for C1.
- ***Writing***. Ability to: make reasonable accurate notes in meetings and lectures; write a piece of work whose message can be followed throughout; write a piece of work showing the ability to communicate with no serious errors.
- ***Listening and speaking***. Ability to: contribute effectively in meetings and seminars in own field of study, probing for more information if required; maintain a casual conversation with a good degree of fluency; take part in an abstract conversation with a good degree of fluency; follow discussions and arguments with only occasional need for clarification; employ good compensation strategies to overcome linguistic inadequacies; deal with unpredictable questions; give critical feedback in a non-offensive manner.

Based on CEFR. For more details see: https://learn.hz.nl/pluginfile.php/289968/mod_resource/content/0/CEFR-all-scales-and-all-skills.pdf

Learning outcomes:

Strong C-1 level

Compulsory literature:

Open World First Student's Book with Answers with Online Practice, Anthony Cosgrove Deborah Hobbs, 1e version, ISBN: 9781108759052, Costs: €36,99, Open World First Student's Book with Answers with Online Practice

Assessment information

Tests code	**Assessment type**	**Content**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities**
TEST01 (VT)	Written knowledge test	Reading and Use of English	40%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST02 (VT)	Written knowledge test	Writing	20%	5,5	B3.8; B4.8; B3.10; B4.10
TEST03 (VT)	Written knowledge test	Listening	20%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST04 (VT)	Assignment (group)	Speaking	20%	5,5	B4.8; B3.9; B4.9; B3.10; B4.10

Semester: S1 - S2	
EN39004	**Title: Foundation Course C2**
Course information	
Number of study credits: 5	**Language:** English
Conditions for course participation: -	
Conditions for test participation: -	

Brief description of course content:

Students can take the placement test and/or consult the LCC teacher before they decide for which English foundation course they will register. Course level: C1/low C2 aiming at strong C2.

Learning Outcomes:

- ***Reading/Use of English***. Ability to: understand complex documents and reports; understand academic articles in a relevant field including complex ideas expressed in complex language; access all sources of information quickly and reliably; apply and adapt language suitable for C2.
- ***Writing***. Ability to: make full notes of meetings and seminars with good expression and accuracy; make full notes of meetings and seminars while continuing to participate; make accurate and complete notes of a lecture.
- ***Listening and speaking***. Ability to: advise on or talk about sensitive or complex issues (within field of knowledge) with ease; deal confidently with hostile questions; speak fluently and express/understand nuances of language; present a clear, smooth-flowing description or argument in a style appropriate to the context with an effective logical structure.

Based on CEFR. For more details see: https://learn.hz.nl/pluginfile.php/289968/mod_resource/content/0/CEFR-all-scales-and-all-skills.pdf

Learning outcomes:

Strong C-2 level

Compulsory literature:

Objective Proficiency Student's Book with Answers with Downloadable Software Annette Capel and Wendy Sharp, Annette Capel and Wendy Sharp, ISBN: 9781107646377, Costs: €35,99, Objective Proficiency Student's Book with Answers with Downloadable Software Annette Capel and Wendy Sharp

Assessment information

Tests code	**Assessment type**	**Content**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities**
TEST01 (VT)	Written knowledge test	Reading and Use of English	40%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST02 (VT)	Written knowledge test	Writing	20%	5,5	B3.8; B4.8; B3.10; B4.10
TEST03 (VT)	Written knowledge test	Listening	20%	5,5	B3.6; B4.6; B3.7; B4.7; B3.8; B4.8; B3.9; B4.9
TEST04 (VT)	Assignment (group)	Speaking	20%	5,5	B4.8; B3.9; B4.9; B3.10; B4.10

3RD YEAR

Block 1 / Semester: S1 & Block 1 / Semester: S2					
CU75033V2	**Title: Internship SE**				
Course information					
Amount of study credits: 25			**Language:** Dutch **OR** English		
Conditions for course participation: • *the student is in possession of the propaedeutic certificate of the HBO-ICT program;* • *the student has obtained at least 30 EC of completed courses in the second year of the program (semesters 3 and 4)*					
Conditions for test participation: none					
Brief description of course content: The internship of the HBO-ICT program aims to: learn to function professionally in a business, ICT-related environment. This is achieved by the student by setting his own learning objectives based on the HBO-ICT professional competences and by reflecting on his own performance. It concerns primarily professional tasks specifically in the field of software engineering.					
Course learning outcomes: 4.1N, You can independently make an analysis of a software engineering design problem in an internship context 4.2P, You can independently select, document, communicate and evaluate solutions for a software engineering design problem in an internship context using tests and prototypes 4.3O, You can independently realise a suitable solution for a software engineering design problem in an internship context 4.4A, You can independently give a suitable advice for solving a software engineering design problem in an internship context 7.1Q: You can function professionally in a company-related, ICT-related environment					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	5.5	See learn manual

Block 1 / Semester: S1 & Block 1 / Semester: S2					
CU75034V2	**Title: Internship DS**				
Course information					
Amount of study credits: 25			**Language:** Dutch **OR** English		
Conditions for course participation: • *the student is in possession of the propaedeutic certificate of the HBO-ICT program;* • *the student has obtained at least 30 EC of completed courses in the second year of the program (semesters 3 and 4)*					
Conditions for test participation: none					
Brief description of course content: The internship of the HBO-ICT program aims to: learn to function professionally in a business, ICT-related environment. This is achieved by the student by setting his own learning objectives based on the HBO-ICT professional competences and by reflecting on his own performance. It concerns primarily professional tasks specifically in the field of software engineering.					
Course learning outcomes: 6.1K: You can independently set up a data science process in a internship context 6.2Q: You independently collect and address relevant data in a internship context 6.3J: You can independently perform data analysis in a internship context 6.4K: You can independently evaluate and deploy results of a data science process in a internship context 7.1Q: You can function professionally in a company-related, ICT-related environment					
Compulsory literature: none					
Assessment information					

Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	5.5	See learn manual

Block 1 / Semester: S1 & Block 1 / Semester: S2					
CU75035V2	**Title: Internship BIC**				
Course information					
Amount of study credits: 25			**Language:** Dutch **OR** English		
Conditions for course participation: • *the student is in possession of the propaedeutic certificate of the HBO-ICT program;* • *the student has obtained at least 30 EC of completed courses in the second year of the program (semesters 3 and 4)*					
Conditions for test participation: none					
Brief description of course content: The internship of the HBO-ICT program aims to: learn to function professionally in a business, ICT-related environment. This is achieved by the student by setting his own learning objectives based on the HBO-ICT professional competences and by reflecting on his own performance. It concerns primarily professional tasks specifically in the field of software engineering.					
Course learning outcomes: 2.1G: You can independently make a validated process analysis for an ICT provision in the context of an internship 2.2D: You can independently make a validated process design and understand the relationship with the information provision in the context of an internship. [INTERNSHIP BIC] 2.5A: You can independently draw up a management plan for ICT processes in a internship context according to a chosen framework, taking into account updating, design, maintenance and quality assurance 7.1Q: You can function professionally in a company-related, ICT-related environment					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	5.5	See learn manual

PERSONALITY

CU75059V1	**Title: IT Personality 3**[8]				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2L: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[9]	See learn manual

[8] Mandatory: *Further information see manual of personality on learn, goes for all IT Personality courses*
[9] P/NP stands for Passed/Not Passed.

CU75058V1	**Title: IT Personality Projectweek 2**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: This course can be followed 3 times during the study programme. Course description for CU75054, CU75058, and CU75075 are identical. IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. Each year the ICT program organizes a projectweek with real life casus and (if possible) in cooperation with other programs. This projectweek course can be chosen as 1,25 ec content for personality. The assessment criteria and assessment process are listed in the IT Personality 2021-2022 instruction manual which can be found on the Learn page. This course is already approved for IT personality, students only need to define their personal goals within the given context.					
Course learning outcomes: 7.2M: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals through participation in a project week					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[10]	See learn manual

Block 1 / Semester: S1					
CU75075V1	**Title: IT Personality Projectweek 3**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **OR** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: This course can be followed 3 times during the study programme. Course description for CU75054, CU75058, and CU75075 are identical. IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. Each year the ICT program organizes a projectweek with real life casus and (if possible) in cooperation with other programs. This projectweek course can be chosen as 1,25 ec content for personality. The assessment criteria and assessment process are listed in the IT Personality 2021-2022 instruction manual which can be found on the Learn page. This course is already approved for IT personality, students only need to define their personal goals within the given context.					
Course learning outcomes: 7.2M: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals through participation in a project week					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[11]	See learn manual

[10] P/NP stands for Passed/Not Passed.
[11] P/NP stands for Passed/Not Passed.

CU75060V1	**Title: IT Personality 4**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2L: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[12]	See learn manual

CU75061V1	**Title: IT Personality 5**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2L: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[13]	See learn manual

CU75062V1	**Title: IT Personality 6**
Course information	
Amount of study credits: 1.25	**Language:** Dutch **AND** English
Conditions for course participation: none	
Conditions for test participation: none	
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having	

[12] P/NP stands for Passed/Not Passed.
[13] P/NP stands for Passed/Not Passed.

obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.

Course learning outcomes:
7.2L: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals

Compulsory literature: none

Assessment information

Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[14]	See learn manual

[14] P/NP stands for Passed/Not Passed.

CU75063V1	**Title: IT Personality 7**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2L: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[15]	See learn manual

CU75064V1	**Title: IT Personality 8**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2L: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[16]	See learn manual

[15] P/NP stands for Passed/Not Passed.
[16] P/NP stands for Passed/Not Passed.

CU75065V1	**Title: IT Personality 9**				
Course information					
Amount of study credits: 1.25			**Language:** Dutch **AND** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: IT Personality content is based on the HZ-wide programme HZ personality that stimulates the skills concerning and attitudes towards personal development and personal leadership. The programme can either have a broadening or a deepening focus when it comes to the curriculum. A prerequisite for starting the HZ Personality related activities is having obtained a GO from one of the IT personality coordinators. The assessment criteria and assessment process are listed in the HZ Personality 2021-2022 instruction manual which can be found on the Learn page.					
Course learning outcomes: 7.2L: Developing skills and behavior to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	P/NP[17]	See learn manual

[17] P/NP stands for Passed/Not Passed.

4TH YEAR

Block 2 / Semester: S1					
CU75042V1	**Title: Security By Design**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: In terms of content, various (advanced) security principles are cited in this course. Students must map and audit an existing, complex system using the given methods and then write appropriate advice about security in the system.					
Course learning outcomes: 4.1M: you can map the trust boundaries of a complex system 4.3N: you perform a security audit through a given model 4.4B: you write a suitable advice on the results of a security research that was held 4.4C: you explain the results of the security audit according to a model					
Compulsory literature:					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Advice report	100%	5.5	S1.18 & S1.20

Block 2 / Semester: S1					
CU75043V2	**Title: Making Business intelligent**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: In terms of content, various (advanced) data sets are used in this course to ultimately display self-invented KPIs in a BI report.					
Course learning outcomes: 2.1E: you understand the importance of a sound BI report 2.1F: you understand what the necessity of BI is for companies 2.1L: You analyze and evaluate the impact of Business Intelligence (BI) on the architecture of an organization from the perspective of Enterprise Architecture. 2.2C: you understand the ETL and the matching report process 2.3A: you create KPIs for a dataset that you substantiate yourself and create a matching BI report 2.3B: you carry out the entire process from importing the data to creating the report					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio + optional assessments	100%	5.5	S1.18 & S1.20

Block 1 / Semester: S1					
CU75044V1	**Title: Change, Yes you Can**				
Course information					
Amount of study credits: 5			**Language:** Dutch		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: In terms of content, the soft skills in the field of conversation techniques are practiced in this course (how do you deal with a bad news conversation, how do you deal with resistance, how do you deal with someone who does not listen, etc.). The hard skills are researching change strategies, so that you can implement this theory later in the project.					
Course learning outcomes: **Test 1:** 7.3K: you can communicate in a sound way with various departments within a company, taking into account hierarchical layers **Test 2:** 2.2B: you can map sound change strategies, so that you can choose the right strategy for the right change/company in a methodical way					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Individual process assessment	Assessment	50%	5.5	S1.8 & S1.10
TOETS02 (VT)	Report	Report	50%	5.5	S1.8 & S1.10

Block 1 / Semester: S1					
CU75045V1	**Title: Modern Programming Practices**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: Discuss and apply advanced programming and software engineering concepts, such as concurrency and paradigms, while taking into account the impact on quality of the software.					
Course learning outcomes: 4.2O: you recognise and explain with which programming techniques you can solve certain software problems 4.3M: you apply the right combination of programming techniques for the problems in a complex software system					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	5.5	S1.8 or S1.9 & S1.10

Block 2/ Semester: S1					
CU75046V1	**Title: Data Management & Governance**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: none					
Brief description of course content: In this course you will get to know all aspects related to data management based on the DM-Boks. In addition, a number of aspects are chosen that are deepened (think of legal aspects, GDPR, Meta data etc.)					
Course learning outcomes: 6.1L: You can compose a data management plan for a specific project, taking in account al facets of a given, recognised standard					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio	100%	5.5	S1.18 & S.1.20

Block 1 & 2 / Semester: S1					
CU75047V2	**Title: Complex Project SE**				
Course information					
Amount of study credits: 15			**Language:** English		
Conditions for course participation: • The student is in possession of the propaedeutic certificate of the HBO-ICT programme; • The student has obtained at least 60 EC from the main phase with completed courses; • The student has passed the internship (CU75033V2)[18].					
Conditions for test participation: none					
Brief description of course content: In this course the student will do a complex project in a small group under coaching of lecturers and experts. The project and professional products will be specific for the study track. The form and account of the results are similar with the graduation phase.					
Course learning outcomes: **Test 1:** 7.1M: you can employ the right professional skills to complete a project successfully in a complex environment 7.1N: you account for the choices made regarding the professional skills employed 7.3M: As a project group you deliver structured products and account for everyone's role within the project, the method followed and evaluate the process and the product critically 4.1O: you describe functional and quality specifications and limiting preconditions, in which at least maintenance and manageability are included in the local infrastructure and development processes 4.1P: you use various types of sources and techniques for collecting specifications and preconditions. 4.1Q: You can validate the formulated specifications and preconditions and thus assess the degree of completeness and objectivity 4.1R: You can thoroughly describe a technical and/or process-related problem concerning the production of software 4.2Q: you evaluate solutions based on the stated specifications and limitations (consistency) using tests, prototypes and comparable techniques. In addition, you analyse data collected with qualitative and/or quantitative analysis techniques 4.2R: you select candidate solutions based on relevant, current and specialist professional knowledge from the ICT domain 4.2S: you apply appropriate schematic techniques in the document where possible, which are in line with the chosen design strategy and goaled at the target group, which in any case consists of developers who (further) develop the product. 4.3P: you realise (prototypes of) a system existing of several sub systems and/or existing components 4.3Q: You can do research into the quality of the realised software such as functionality, security and performance 4.4D: you advise the customer on a solution for a software problem, convince the customer that the solution is in line with his/her objective and vision and you support the customer in the implementation of the solution or you give you process-oriented advice **Test 2:** 7.3L: As a project group you can report and present professionally, both verbally and in a report					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio+assessment	80%	5.5	
TOETS02 (VT)	Presentation (individual)	Presentation	20%	5.5	

[18] Students may submit a request for participation without internship, based on their obtained minor results and will be judged by examiners.

Block 1&2 / Semester: S1					
CU75066V1	**Title: Complex Project BIC**				
Course information					
Amount of study credits: 15			**Language:** English		
Conditions for course participation: • The student is in possession of the propaedeutic certificate of the HBO-ICT program; • The student has obtained at least 60 EC from the main phase with completed courses; • The student has passed the internship (CU75035V2)[19].					
Conditions for test participation: none					
Brief description of course content: In this course the student will do a complex project in a small group under coaching of lecturers and experts. The project and professional products will be specific for the study track. The form and account of the results are similar with the graduation phase.					
Course learning outcomes: **Test 1:** 7.1M: you can employ the right professional skills to complete a project successfully in a complex environment 7.1N: you account for the choices made regarding the professional skills employed 7.3M: As a project group you deliver structured products and account for everyone's role within the project, the method followed and evaluate the process and the product critically 2.1H: you clarify the company's current situation through coordinated KPIs and an obtained data set and you make an inventory of where the company can still take steps for improvement. Taking into account improvements in, among other things, new technologies 2.2E: you analyse the IST of the processes within the company and you come up with realistic improvement proposals based on the various models and your own vision (SOLL) 2.3C: you realise and evaluate an implementation (plan) based on your own design, so the company has a ready made plan to follow through with the implementation of the changes 2.3D: you describe (and carry out if possible) a relevant change management method and strategy in which you help the employees with the changes they are about to encounter so that you can help resolve possible resistance 2.4C: you advise in a well-argued manner the best option for change based on your own vision/core values, a theoretical change model and the core values of the company. 2.5B: you manage the company processes and ensure that they grow with the company or that there is a plan with which these processes are kept up-to-date, taking into account updating, design, maintenance and quality assurance **Test 2:** 7.3L: As a project group you can report and present professionally, both verbally and in a report					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio + assessment	80%	5.5	
TOETS02 (VT)	Presentation (individual)	Presentation	20%	5.5	

Block 1&2 / Semester: S1					
CU75067V1	**Title: Complex Project DS**				
Course information					
Amount of study credits: 15			**Language:** English		
Conditions for course participation:					

[19] Students may submit a request for participation without internship, based on their obtained minor results and will be judged by examiners.

• The student is in possession of the propaedeutic certificate of the HBO-ICT program; • The student has obtained at least 60 EC from the main phase with completed courses; • The student has passed the internship (CU75034V2)[20].
Conditions for test participation: none
Brief description of course content: In this course the student will do a complex project in a small group under coaching of lecturers and experts. The project and professional products will be specific for the study track. The form and account of the results are similar with the graduation phase.
Course learning outcomes: **Test 1:** 7.1M: you can employ the right professional skills to complete a project successfully in a complex environment 7.1N: you account for the choices made regarding the professional skills employed 7.3M: As a project group you deliver structured products and account for everyone's role within the project, the method followed and evaluate the process and the product critically 6.1J: You describe data mining activities based on choice of the best applicable machine learning model and relevant required activities 6.2L: You validate data through statistical testing 6.2M: You imputate relevant values to the chosen data to substitute missing values 6.2N: You construct data by feature extracting (aggregates, target encoding) and/or unstructured data 6.2O: You integrate relevant data by merging & joining across multiple levels 6.2P: You convert data formats using sparse representation and include useful generators to enhance performance of your techniques 6.3G: You define a test design using cross validation & time splits 6.3H: You build a model taking feature selection, model tuning, bias, variance over/under fitting & learning curves into account 6.3I: You asses your model outcome using advanced metrics and graphical aids 6.4I: You determine the next steps in a additional data science process cycle providing a conclusion supplemented with recommendations 6.4J: You advice the business successively implementing the data science process by a plan **Test 2:** 7.3L: As a project group you can report and present professionally, both verbally and in a report
Compulsory literature: none

Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio + assessment	80%	5.5	
TOETS02 (VT)	Presentation (individual)	Presentation	20%	5.5	

[20] Students may submit a request for participation without internship, based on their obtained minor results and will be judged by examiners.

Block 1&2 / Semester: S1 & Block 1&2/ Semester: S2					
CU75048V3	**Title: Graduation Preparation**				
Course information					
Amount of study credits: 5			**Language:** English		
Conditions for course participation: none					
Conditions for test participation: *the student is allowed to take the test when allowed course participation Complex project*[21]					
Brief description of course content: In this course the student will be prepared on their graduation. This includes workshops about the transition from student to professional but also guidance on finding a graduation company that is a good fit to the student, guidance in writing a graduation proposal and guidance in writing a graduation plan including research related tools.					
Course learning outcomes: 7.5A: you can make a proposal for a sufficiently complex graduation assignment 7.5B: you can draw up a graduation plan for a complex graduation assignment					
Compulsory literature: none					
Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Report	Graduation plan	100%	5.5	S1.8, S1.18, S2.8, S2.18

[21] BIC = *CU75066V1,* SE = *CU75047V2*, DS = CU75067V1

Block 1&2 / Semester: S1 & Block 1&2 / Semester: S2	
CU75049V1	**Title: Graduation Data Science**
Course information	
Amount of study credits: 30	**Language:** Dutch **OR** English
Conditions for course participation: • *the student is in possession of the propaedeutic certificate of the HBO-ICT program;* • *the student has obtained at least 137.5 EC from the main phase with completed courses.*	
Conditions for test participation: *As included in Graduation Student Manual on the graduation Learn page.*	
Brief description of course content: Students conduct their graduation on a complex practical assignment in a complex situation. The students does this independently. The final products are qualitative sufficient professional software engineering products, supplemented with an account of the methodical and professional approach. Final results will be presented followed by an assessment of two examiners and possibly one external expert.	
Course learning outcomes: **Test 1:** 7.1O: you can independently in a complex environment employ the right professional skills to complete a project successfully 7.1P: you account for the choices made regarding the professional skills employed. 7.3O: You deliver structured products, account for the method followed and evaluate the process and the product critically 6.1L: You can independently set up a data science process in a complex context. 6.2R: You independently collect and address relevant data in a complex context 6.3K: You can independently perform data analysis in a complex context. 6.4L: You can independently evaluate and deploy results of a data science process in a complex context **Test 2:** 7.3N: You can report and present professionally, both verbally and in a report	
Compulsory literature: none	

Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio+assesment	80%	5.5	S1.7, S1.10, S1.17, S1.20, S2.7, S2.10, S2.17, S2.20
TOETS02 (VT)	Presentation (individual)	Presentation	20%	5.5	S1.9, S1.10, S1.19, S1.20, S2.9, S2.10, S2.19, S2.20

Block 1&2 / Semester: S1 & Block 1&2 / Semester: S2	
CU75050V1	**Title: Graduation Software Engineering**
Course information	
Amount of study credits: 30	**Language:** Dutch **OR** English
Conditions for course participation: • The student is in possession of the propaedeutic certificate of the HBO-ICT program; • The student has obtained at least 137.5 EC from the main phase with completed courses.	
Conditions for test participation: As included in Graduation Student Manual on the graduation Learn page	
Brief description of course content: Students conduct their graduation on a complex practical assignment in a complex situation. The students does this independently. The final products are qualitative sufficient professional software engineering products, supplemented with an account of the methodical and professional approach. Final results will be presented followed by an assessment of two examiners and possibly one external expert.	
Course learning outcomes: **Test 1:** you can independently in a complex environment employ the right professional skills to complete a project successfully 7.1P: you account for the choices made regarding the professional skills employed 7.3O: You deliver structured products, account for the method followed and evaluate the process and the product critically 7.3P: Students can present their project, the content of their portfolio and their process considerations in a sound way making plausible the equal contribution of each project member to the project. You independently make an analysis of a software engineering design problem in a complex context 4.2T: You can independently select, evaluate (partial), document and communicate solutions for a software engineering design problem in a complex context 4.3R: You independently realise a suitable solution to a software engineering design problem in a complex context, independently 4.4E: You independently give a suitable advice for solving a software engineering design problem in a complex context **Test 2:** 7.3N: You can report and present professionally, both verbally and in a report	
Compulsory literature: none	

Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio+assesment	80%	5.5	S1.7, S1.10, S1.17, S1.20, S2.7, S2.10, S2.17, S2.20
TOETS02 (VT)	Presentation (individual)	Presentation	20%	5.5	S1.9, S1.10, S1.19, S1.20, S2.9, S2.10, S2.19, S2.20

Block 1&2 / Semester: S1 & Block 1&2 / Semester: S2	
CU75051V1	**Title: Graduation Business IT Consultant**
Course information	
Amount of study credits: 30	**Language:** Dutch **OR** English
Conditions for course participation: • The student is in possession of the propaedeutic certificate of the HBO-ICT program; •The student has obtained at least 137.5 EC from the main phase with completed courses.	
Conditions for test participation: *As included in Graduation Student Manual on the graduation Learn page.*	
Brief description of course content: Students conduct their graduation on a complex practical assignment in a complex situation. The students does this independently. The final products are qualitative sufficient professional software engineering products, supplemented with an account of the methodical and professional approach. Final results will be presented followed by an assessment of two examiners and possibly one external expert.	
Course learning outcomes: **Test 1:** 7.1O: you can independently in a complex environment employ the right professional skills to complete a project successfully 7.1P: you account for the choices made regarding the professional skills employed 7.3O: You deliver structured products, account for the method followed and evaluate the process and the product critically 2.1J: You can independently make a validated process analysis (IST) for the ICT provisions in a complex context 2.2F: You can independently make a validated and considered process design (SOLL) in a complex context 2.3E: You independently realise an implementation(plan) and test the acceptance in a complex context 2.4D: You can independently give a sound organizational advice for implementing ICT possibilities in a complex context 2.5.C: You can independently draw up a control plan for ICT processes in a complex context. **Test 2:** 7.3N: You can report and present professionally, both verbally and in a report	
Compulsory literature: none	

Assessment information					
Test code	**Assessment type**	**Assessment description**	**Weighting Factor** (%)	**Minimum score**	**Test opportunities** (block codes)
TOETS01 (VT)	Portfolio	Portfolio+assessment	80%	5.5	S1.7, S1.10, S1.17, S1.20, S2.7, S2.10, S2.17, S2.20
TOETS02 (VT)	Presentation (individual)	Presentation	20%	5.5	S1.9, S1.10, S1.19, S1.20, S2.9, S2.10, S2.19, S2.20

Appendix 3 – Program profile matrix breakdown

Program profiles for the tracks from cohort 2017-2018 and newer.

Program profile for SE track

	Analysis	Design	Realisation	Advise	Manage & Control
User Interaction	2	2	2		
Organisational Processes	2	1		2	
Infrastructure		2	1	2	2
Software	3	3	3	3	3
Hardware Interfacing	1				
Data Science	2	2	2	2	-
Professional Skills	3	2	3	3	

Program profile for DS track

	Analysis	Design	Realisation	Advise	Manage & Control
User Interaction	2	2	2	2	
Organisational Processes	2	1		2	
Infrastructure		2	1	2	2
Software	2	2	1-2		3
Hardware Interfacing	1				
Data Science	3	3	3	3	-
Professional Skills	3	2	3	3	

Program profile for BIC track

	Analysis	Design	Realisation	Advise	Manage & Control
User Interaction	2	2	2	2	
Organisational Processes	3	3	2	3	3
Infrastructure			1		2
Software	2	2	1		3
Hardware Interfacing	1				
Data Science	2	2	2	2	-
Professional Skills	3	3	3	3	