Implementation Regulations CER HZ

Bachelor

HBO-ICT

Full-time

CROHO 30020

2022-2023

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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: HZ CER ba ft) cover the core of education within the HZ. This document provides a general overview of all programmes taught at the HZ. The HZ CER Ba ft contains institution-specific provisions, i.e. those that apply to the entire HZ. A programme-specific HZ CER 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 HZ CER ba ft 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 ba ft.

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 1.3.4 CER HZ ba ft).

1.3 Programme committee

1.3.1 The Programme Committee is provided the opportunity to advise the Executive Board before the Implementation Regulations are determined.

1.3.2 The Programme Committee assesses the execution of the Education and Examination Regulations and the Implementation Regulations annually.

1.4 Director

1.4.1 The appointed director is responsible for:

a. the execution of the CER HZ;
b. the implementation and execution of the Implementation Regulations;
c. the annual evaluation on behalf of the Executive Board of the CER HZ and the Implementation Regulations, in which he measures and monitors the amount of time students need and adjust the study load, if necessary (article 7.14 WHW);
d. preparing the adjustments to the Implementation Regulations..

CHAPTER 2 IMPLEMENTATION REGULATIONS

2.1 Registration, prior educational requirements, and admission policy

2.1.1 **Overview of additional prior educational requirements** (article 2.3 HZ CER Ba ft in addition to the requirements as listed under article 2.2 and 2.2a and 2.2b of HZ CER Ba ft)

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 Ba ft)

The study programme profile of ICT is based on the domain description Bachelor of ICT of HBO-I (Hoger Beroepsonderwijs ICT-opleidingen/Applied higher educational ICT-programs). [1]

The HBO-I domain description (further named domain description) serves as a functional qualifications framework for universities and focuses on the starting proficiency of future ICT professionals.

The HBO-I domain description is a national framework for the final qualifications for graduates of Dutch programmes for higher professional education (HBO in Dutch) in the ICT domain at an Associate, Bachelor and Professional Master degree level. The domain description is maintained by the HBO-I foundation. Related to and inspired by international developments, frameworks and formats, the domain description is periodically updated in collaboration with the business community and is established by The Netherlands Association of Universities of Applied Sciences. (HBO-I, 2018)

The domain description holds an account for the relevant competences (body of knowledge and skills), the breakdown of competences into professional duties including some 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.

In order to keep up with the rapidly developing ICT field, the domain description will be regularly modified and updated. A HBO-I taskforce has developed a Data Science addendum for the domain description. In anticipation of this we already have added an architectural layer, Data Science. This will be modified later to fit the HBO-I domain description, when it will be officially updated (expected somewhere in 2023).

The main focus of the programme is solving problems or improving processes, either individually or in a group, by using ICT. Therein the programming skills are an essential skill but the main focus is on the analysing and problem solving skills. Therefore the professional skills of our ICT students are an important focus throughout our whole program. The program focuses on three main aspects namely data science, software engineering and IT consulting.

Themes of real life cases

In the study programme there is a focus on real life casus. These cases will be chosen in the sectors that are important to the Dutch and Zeeland (local) environment. These themes will focus on water related issues, issues concerning the energy transition, renewed food sources, and a vital region to live in (safety, quality of life and mobility). Our IT students learn to change the world one bit(e) at a time.

ICT graduates are characterised by analytical, problem solving and strong advising skills. Our graduates are very adaptable to change, very service oriented and able to communicate clearly and reflect on their professional life on a structural basis. ICT can be used for good and for bad. Our

[1] Based on the 2018 version of the HBO-I domeinbeschrijving (https://HBO-I.nl/domeinbeschrijving/ (retrieved, April 4, 2022)

graduates have learned to use ICT for good, experienced in a variety of projects that use ICT to innovate and equipped with a strong moral and ethical compass.

IT graduates can work in a wide variety of IT jobs. A few years into their careers they might move on to managerial positions such as project manager or senior developer, head of department or to positions such as, Senior consultant, Team lead, SCRUM master, instructor/supervisor, IT professional and so on. They could also end up working in the educational sector, for example 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, for example, software engineer, data sciences, artificial intelligence, computer science, security or more specific oriented IT masters in a certain field. Such a programme can generally be taken in an accelerated form at one of the research universities.

2.2.2 ***Learning outcomes*** (art 3.2 OER HZ)

The ICT program is offered in Dutch and English. Because the content of our program is important information to understand completely Figure 1 and this paragraph described in 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 [2]	how complex is it?

Figure 1: Dimensions of the domain description Bachelor of ICT.

[2] 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.

By operationalizing of the dimensions in these matrices each program creates their own program profile. This is displayed in a matrix with the ICT-architectural layer and activity. For each cross-section one or more professional tasks are defined on a certain proficiency level.

Cohorts 2019-2020 and newer

In the basis we have a broad ICT bachelor. The first two years is almost the same for everyone. The first year focusses on software engineering, learn to use your tools; most important the programming skills. The second year we focus more on the value created for the customer (by using ICT) this is called digital innovation and transformation and students get to know data science and AI. During the second year there are two times, courses of choice for students. The course data driven business (for study track BIC or DS) and the course software design (for study track SE or DS). And the course Data Visualisation (for study track BIC or DS) and the course Cloud computing (for study track SE and DS). At the end of the second year students can choose three study tracks; Software Engineering (SE), Data Science (DS) and Business IT Consultant (BIC). The chosen study track will be on the addendum of the official certificate (HBO-ICT). The Overall program profile is visualized in Figure 2. The three tracks with each profile are visualized in attachment 1.

	Analysis[3][4]	**Design[5][6]**	**Realisation[7][8]**	**Advise[9][10]**	**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	

Figure 2: Program profile from cohort 2020-2021 and newer.

[3] For DS this is: Set up a DS process
[4] For PSK this is: Personal Leadership
[5] For DS this is: Collect and Address relevant data
[6] For PSK this is: Targeted Interaction
[7] For DS this is: Evaluate and Deploy results
[8] For PSK this is: Future-oriented Organisation
[9] For DS this is: Perform Data Analysis
[10] For PSK this is: Investigative Problem Solving

Cohorts 2017-2018 till 2018-2019

Before 2019-2020 there was one course of choice less. Therefore, the profiles are slightly different. The three tracks together with their own profile are visualized in the attachment of the CER 2020-2021.

Older programmes are transposed to this curriculum.

	Analysis[11][12]	Design[13][14]	Realisation[15][16]	Advise[17][18]	Manage & Control	Agile[19]
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	2-3	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		3

Figure 3: Program profile from cohort 2017-2018 till 2019-2020

[11] For DS this is: Set up a DS process
[12] For PSK this is:Personal Leadership
[13] For DS this is: Collect and Address relevant data
[14] For PSK this is: Targeted Interaction
[15] For DS this is: Evaluate and Deploy results
[16] For PSK this is: Future-oriented Organisation
[17] For DS this is: Perform Data Analysis
[18] For PSK this is: Investigative Problem Solving
[19] Agile is a way of working in which we bring together al professional skills and test them in a project setting in a holistic way.

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]
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 containerisation 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.
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 methodolody, 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 the 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].
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 companies 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 an 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].
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	yYou use containerisation 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 all 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 an 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 revelant 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 an 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 an 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 an 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 an 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 behaviour to achieve personal and professional goals. Carrying out activities that contribute to sustainable development goals, community goals and personal goals.
M	Developing skills and behaviour 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 behaviour 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 are open to feedback. You are open to other opinions / views / arguments and see that as an enrichment. You consciously build 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 a 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 monitor 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 take 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 your 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).	

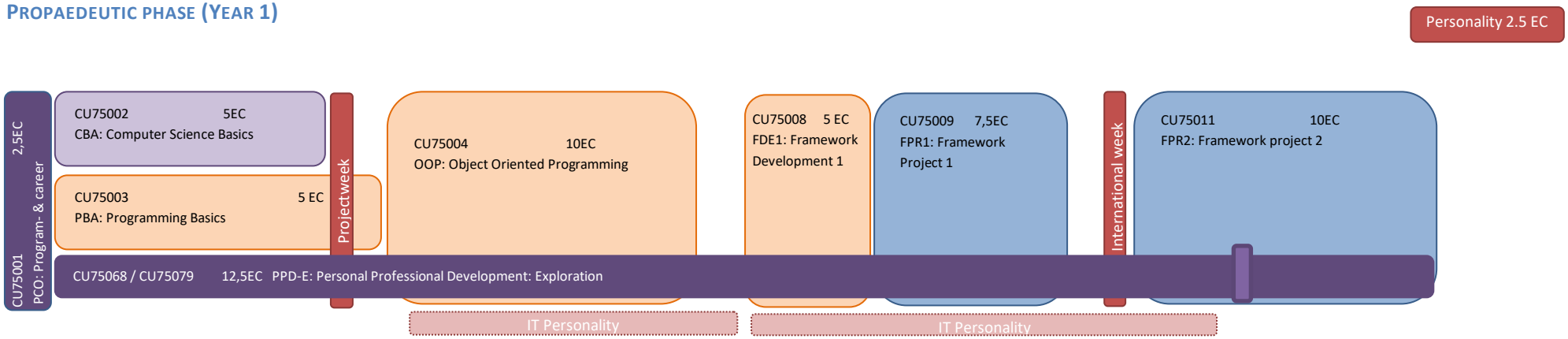
A	You can make a proposal for a sufficiently complex graduation assignment (B13).
B	You can draw up a graduation plan for a complex graduation assignment (B14).
C	As a team you can deep dive in a new innovative technique/technology. Gaining knew knowledge by researching the way that it works and validate it by using an expert and reliable scientific resource.
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, 3.11a en 3.13 CER HZ ba ft)

National name:	B HBO-ICT
International name:	B Information & Communication Technology
Orientation:	Bachelor
Title conferred:	HBO-ICT
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

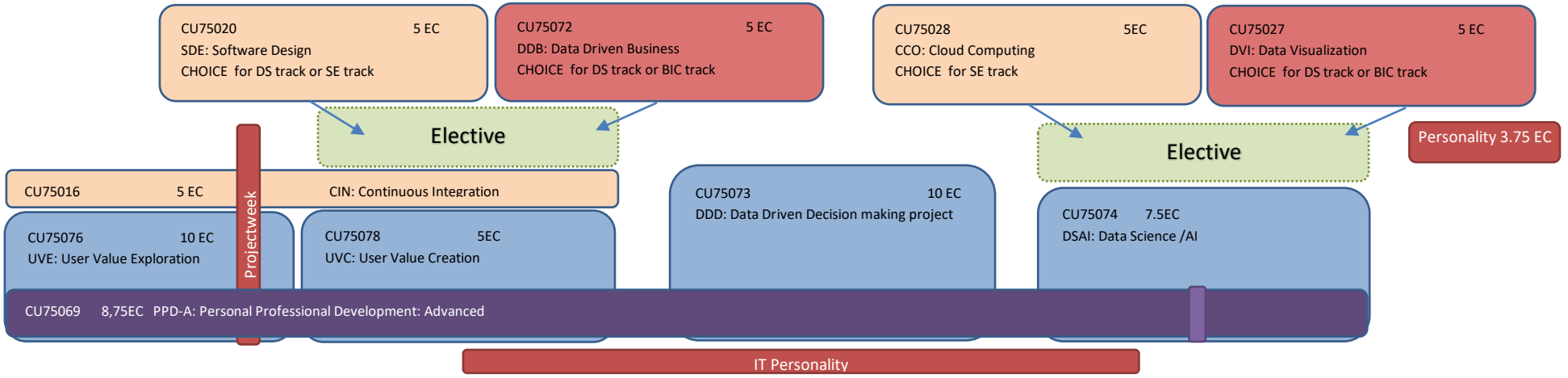
Course structure of the programme

PROPAEDEUTIC PHASE (YEAR 1)

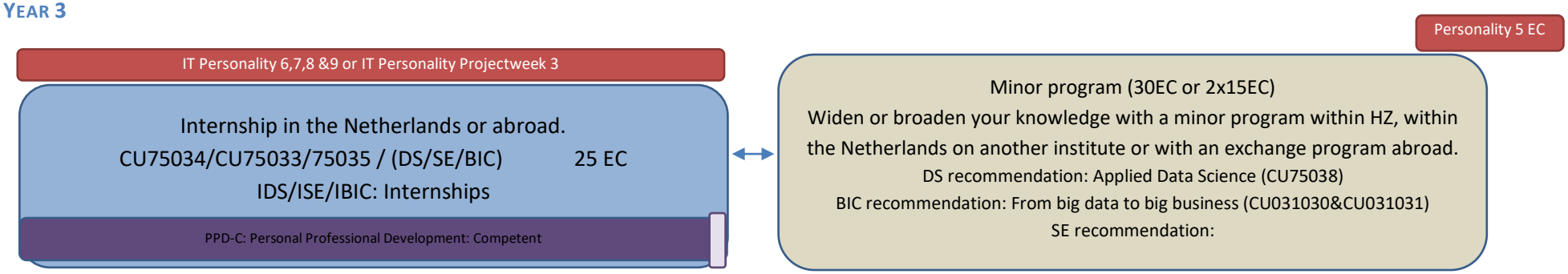


MAIN PHASE

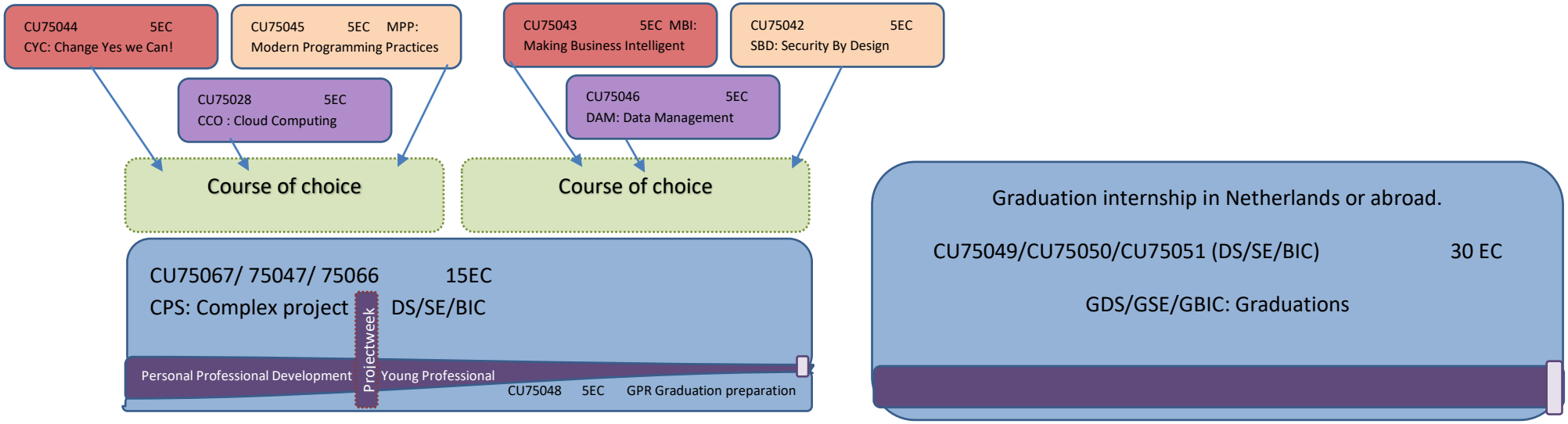
YEAR 2



YEAR 3


Personality 5 EC
IT Personality 6,7,8 &9 or IT Personality Projectweek 3
Internship in the Netherlands or abroad.
CU75034/CU75033/75035 / (DS/SE/BIC) 25 EC
IDS/ISE/IBIC: Internships
PPD-C: Personal Professional Development: Competent
Minor program (30EC or 2x15EC)
Widen or broaden your knowledge with a minor program within HZ, within the Netherlands on another institute or with an exchange program abroad.
DS recommendation: Applied Data Science (CU75038)
BIC recommendation: From big data to big business (CU031030&CU031031)
SE recommendation:

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

2.2.3a Transfer with an Associate Degree certificate (article 3.3 paragraph 4 sub l CER HZ ba ft)

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.

English translation, informative:

Admission of students with an Ad certificate: Students with an Ad certificate in Computer Science (Isat80075) issued by Avans University of Applied Sciences (Brin 07GR), location Roosendaal, the Netherlands, are directly entitled to admission. These students may also enrol in the post-propaedeutic phase of the programme in their first year of enrolment. The board of the institution grants them exemption from the requirement to be in possession of a certificate of successful completion of the propaedeutic examination (via WHW article 7.30 paragraph 2). The board of examiners grants exemption to students with this certificate on an individual basis from taking examinations for which the board of examiners has established, prior to the first year of enrolment, by means of a programme comparison, that the student has the knowledge, insight and skills at the level that is being examined in these examinations. To this end, students must request such exemptions in accordance with OER (Bachelor's and Experiment Learning Outcomes) article 4.6 and article 4.5 OER (Associate Degrees). The above does not apply to students with an Ad diploma in Computer Science issued by other universities than the ones mentioned above, nor to students with an Ad diploma from a programme other than Ad.

2.2.3b Language

The study programme adheres to the following rules regarding language.

Placement

In the beginning of the first period in year 1, all first year students will take a placement test. This test will define whether a student will join the B2 or C1 class by the Language Competence Centre (LCC). The entire course will be provided by the LCC, including tests. When a student passes the LCC course, this will ensure the language test of course PPD-E (CU75068 for INT and CU75079 for NL) is set to Passed. The obtained level will be noted on the diploma or handed separately. Furthermore, students can choose to sign up for the level C2 trying to achieve the proficiency level. Moreover, students can individually apply for an official test by Cambridge on their own initiative and payment. Agreements can be made directly with the LCC.

Exemption

All students that own a certificate no more than 3 years old and has at least a B score of a B2 certificate or otherwise a grade of 7 or higher on an IELTS test, may apply for exemption. The LCC will give out an advice on the intended exemption, which will be handled by the examination board and granted or not. The procedure will be handled by the LCC. As soon as exemption is granted, this will set the language test of PPD-E (CU75068 for INT and CU75079 for NL) to Passed.

First semester of the first year

Lessons and tests of the theoretical part will take place in two separate groups, Dutch and English. As an exception, collective meetings will be organised (in English), for instance by guest speakers. Dutch students are allowed to follow classes in English on a voluntary basis.

All the material will be in English. For ICT much of the material has always been in English and MBO/HAVO reading level English of starting students is sufficient.

Second semester of the first year

Lessons will take place in one mixed or separate groups and the common language is English. Written or digital tests will take place in two separate groups, Dutch and English. All individual assessments (such as portfolio or reports) are submitted in English or Dutch depending on which stream the student is in.

First semester of the second year

Lessons will generally take place in separate groups both in Dutch and English. With an exception for Design thinking within UVE(CU75076V1) and the two electives; Software Design (SDE CU75020V2) and Data driven Business (CU75072V1) the language will be English. Written or digital tests will take place in two separate groups, Dutch and English with an exception on the above stated courses. All individual hand in tests (like portfolio or reports) are delivered in English or Dutch depending in which stream the student project group is.

Second semester of the second year and on

As from Cohort 2020-2021 the second semester 2nd year and the whole of the 3rd and 4th year: The language of instruction and examining is English, except for the work placement / graduation phase at the request of the work placement company / company where the student complete their graduation. Cohorts up to and including 2019-2020 2nd, 3rd and 4th year: The language of instruction and examining is Dutch. Except for the work placement / graduation phase at the request of the work placement company / company where the student completes his graduation.

2.2.4 ***Courses 'propedeuse' phase*** (article 3.5, 3.11A CER HZ Ba ft)

Abbreviations used in the course tables:

V Verbal exam
W Written exam
O Other test
I Individual test
G Group assessment
BW Blockweek
WD Working day
CW Calendar week

Block 1 / Semester 1 – Computer Science												
CU75001V3	**Title:** *Program- & Career Orientation (PCO)*					**Number of study credits:** 2.5		**Contact hours:** 56		**Mandatory:** Yes	**Teaching language:** NL/ENG	
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 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.*												
Compulsory literature: *none*												
Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	*X*	*X*	*X*		Assessment website (Individual process assessment)	7.2K	100%	5.5	BW 2 or 3	5 WD before resit	BW 8 or 9	< 10 workdays

CU75002V2	**Title:** *Computer Science Basics (CSB)*	**Number of study credits:** 5	**Contact hours:** 45	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		Written knowledge test	5.1A	100%	5.5	BW 8 or 9	5 WD before resit	BW 10	< 10 workdays

CU75003V1	**Title:** *Programming Basics (PBA)*	**Number of study credits:** 5	**Contact hours:** 36	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		Case study exam	4.3G, 4.3H, 4.3I	100%	5.5	BW 8 or 9	5 WD before resit	BW 10	< 10 workdays

CU75054V1	**Title:** *IT Personality Project Week 1 (PPW1)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[20]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2M	100%	P/NP[21]	CW 43 or 44 or 45 or 46	CW 47	CW 3	CW 5

[20] Mandatory: no, 2 out of 4 from CU75054, CU75055, CU75056, CU75057 *(Further information: see manual of personality on learn)*
[21] P/NP stands for Passed/Not Passed.

CU75056V1	**Title:** *IT Personality 1 (ITP1)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[22]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2M	100%	P/NP[23]	CW 43 or 44 or 45 or 46	CW 47	CW 3	CW 5

Block 2 / Semester 1 – Game Development					
CU75004V1	**Title:** *Object-Oriented programming (OOP)*	**Number of study credits:** 10	**Contact hours:** 70	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*		*X*		*X*	Presentation	4.1F, 4.2E 4.3F t/m 4.3I	50%	5.5	BW 8 or 9	5 WD before resit	BW 10	< 10 workdays
TOETS02 (VT)		*X*		*X*		Case study exam	4.3F t/m 4.3I	50%	5.5	BW 5	10 WD before resit	BW 10	< 10 workdays

[22] Mandatory: no, 2 out of 4 from CU75054, CU75055, CU75056, CU75057 *(Further information see manual of personality on learn)*
[23] P/NP stands for Passed/Not Passed. In Dutch Voldaan/Niet voldaan.

Block 3 / Semester 2 – Modern Software Development												
CU75008V1	**Title:** *Framework Development 1 (FDE1)*					**Number of study credits:** 5		**Contact hours:** 60		**Mandatory:** Yes		**Teaching language:** NL/ENG
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.*												
Compulsory literature: *none*												
Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Case study exam	1.3A, 4.2B, 4.2C, 4.3A	100%	5.5	BW 4 or 5	5 WD before resit	BW 10	< 10 workdays

CU75009V4	**Title:** *Framework Project 1 (FPR1)*					**Number of study credits:** 7,5		**Contact hours:** 60		**Mandatory:** Yes		**Teaching language:** NL/ENG
Conditions for course participation: *none*												
Conditions for test participation: *none*												
Brief description of course content: *Requirement analysis (identify requirements and wishes) and software-development process. Students work in groups on real life SDG related cases within given frameworks.*												
Compulsory literature: *none*												
Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	*X*	*X*		*X*	Criterium based interview	1.3B, 4.5A, 7.4E, 4.2A, 4.5C, 4,3B	33%	5.5	BW 8 or 9	>5 WD	BW 10	<10 WD
TOETS02 (VT)		*X*		*X*	*X*	Assignment	2.1A, 2.2A, 4.1A, 4.1B, 4.1C	33%	5.5	BW 8 or 9	>5 WD	BW 10	<10 WD
TOETS03 (VT)		*X*		*X*		Case study exam	4.2A	34%	5.5	BW 8 or 9	>5 WD	BW 10	<10 WD

Block 4 / Semester 2 – Modern Software Development					
CU75011V3	**Title:** *Framework Project 2 (FPR2)*	**Number of study credits:** 10	**Contact hours:** 70	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	*X*			*X*	Final delivery	1.3C, 1.3D 4.5E	25%	5.5	BW 9 or 10	5 WD before resit	BW 10	< 10 WD
TOETS02 (VT)	*X*	*X*		*X*		Report of acceptance tests and optional assessments	4.1D, 4.1E, 4.1G, 4.2D, 4.5B, 4.5D	25%	5.5	BW 1 to 9	5 WD before resit	BW 10	< 10 WD
TOETS03 (VT)		*X*	*X*	*X*		IT Development portfolio	1.3E, 3.3A, 4.3C t/m 4.3E	50%	5.5	Q4: BW 1 to 9 Q2: BW 5	5 WD before resit	Only Q4: BW 10	< 10 WD

CU75055V1	**Title:** *IT Personality International week (PIW)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[24]	**Teaching language:** NL/ENG

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.

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2N	100%	P/NP[25]	CW 16, 17	CW 18	CW 22	CW 24

[24] Mandatory: no, 2 out of 4 from CU75054, CU75055, CU75056, CU75057 *(Further information see manual of personality on learn)*
[25] P/NP stands for Passed/Not Passed.

CU75057V1	**Title:** *IT Personality 2 (ITP2)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[26]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2L	100%	P/NP[27]	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24

[26] Mandatory: no, 2 out of 4 from CU75054, CU75055, CU75056, CU75057 *(Further information see manual of personality on learn)*
[27] P/NP stands for Passed/Not Passed

CU75068V2	**Title:** *Personal Professional Development: Exploration (PPD-E) (INT Class)*	**Number of study credits:** 12,5	**Contact hours:** 70	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		English Test	7.3A, 7.3B, 7.3F	5%	P/NP	BW 8	< 10 WD	BW 10	< 10 WD
TOETS02 (VT)	*X*	*X*		*X*		Criterium focused interview	7.2O to 7.2R, 7.3C to 7.3E, 7.4L to 7.4P, 7.5D to 7.5F	95%	5.5	BW 3 or 4 or 5	< 10 WD	BW 10	< 10 WD

CU75079V1	**Title:** *Personal Professional Development: Exploration (PPD-E) (NL Class)*	**Number of study credits:** 12,5	**Contact hours:** 70	**Mandatory:** Yes	**Teaching language:** NL/ENG
Conditions for course participation: *none*					
Conditions for test participation: *none*					
Brief description of course content: *same as CU75068V2*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT) [28]		*X*		*X*		Test (Dutch)	7.3F	5%	P/NP	BW 8	< 10 WD	BW 10	< 10 WD
TOETS02 (VT)		*X*		*X*		Test (English)	7.3A, 7.3B, 7.3F	5%	P/NP	BW 8	< 10 WD	BW 10	< 10 WD
TOETS03 (VT)	*X*	*X*		*X*		Criterium focused interview	7.2O to 7.2R, 7.3C to 7.3E, 7.4L to 7.4P, 7.5D to 7.5F	90%	5.5	BW 3 or 4 or 5	< 10 WD	BW 10	< 10 WD

[28] TOETS01 (VT) of the course CU75079V1 is only mandatory for students of the Dutch track.

*2.2.5 **Main phase courses*** (article 3.6, 3.11A CER HZ ba ft)

Block 5 / Semester 1 – User Value Exploration					
CU75016V1	**Title:** *Continuous Integration (CIN)*	**Number of study credits:** 5	**Contact hours:** 28	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	*X*	*X*	*X*		Portfolio & Assessment	4.5F t/m 4.5J	100	5.5	BW 8	5 WD before resit	BW 10	< 10 WD

CU75076V1	**Title:** *User Value Exploration (UVE)*	**Number of study credits: 10**	**Contact hours:** 40	**Mandatory:** Yes	**Teaching language:** NL/ENG
Conditions for course participation: *none*					
Conditions for test participation: *none*					
Brief description of course content: *User centered focus on exploring a problem context, setting up an architecture and understanding the user.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		Individual test	1.1B, 1.2B, 1.3K, 4.2N, 4.2J, 4.2V, 4.2W, 4.2U, 4.3S	50%	5.5	BW 4	BW 5	BW 8	BW 9
TOETS02 (VT)	*X*	*X*	*X*	*X*	*X*	Book test and assessment	4.1T, 4.1U, 4.1V, 4.1W	40%	5.5	BW 7	BW 7	BW 8	BW 9
TOETS03 (VT)					*X*	Project work environment assessment	4.3S, 4.2U, 4.2W	10%	5.5	BW 8	BW 9	BW 9	BW 10

CU75058V1	**Title:** *IT Personality Projectweek 2 (PPW2)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[29]	**Teaching language:** NL/ENG

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.

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2M	100%	P/NP[30]	CW 43 or 44 or 45 or 46	CW 47	CW 3	CW 5

[29] Mandatory: no, 3 out of 4 from CU75058, CU75059, CU75060, CU75061 *(Further information see manual of personality on learn)*
[30] P/NP stands for Passed/Not Passed.

CU75059V1	**Title:** *IT Personality 3 (ITP3)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[31]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2L	100%	P/NP[32]	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24

Block 6 / Semester 1 – User Value Creation					
CU75078V1	**Title:** *User Value Creation (UVC)*	**Number of study credits: 5**	**Contact hours:** 50	**Mandatory:** Yes	**Teaching language:** NL/ENG
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*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	*X*			*X*	Group assessment based on products in a portfolio	1.1B, 1.3M, 1.3L, 1.3N, 4.2N, 4.2J, 4.2K, 4.3S	100%	5.5	BW 7	BW 7	BW 8	BW 10

[31] Mandatory: no, 3 out of 4 from CU75054, CU75055, CU75056, CU75057 *(Further information see manual of personality on learn)*

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

CU75072V1	**Title:** *Data Driven Business (DDB)*	**Number of study credits:** 5	**Contact hours:** 24	**Mandatory:** Yes[33]	**Teaching language:** ENG

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).*

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		Report	2.1K, 2.4E, 2.4F	60%	5.5	BW 8	WD < 10	BW 10	< 10 WD
TOETS02 (VT)	*X*			*X*	*X*	Presentation	2.1K, 2.4E, 2.4F	40%	5.5	BW 9	WD < 5	BW 10	< 10 WD

CU75020V2	**Title:** *Software Design (SDE)*	**Number of study credits:** 5	**Contact hours:** 24	**Mandatory:** Yes[34]	**Teaching language:** ENG

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.*

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		Report	4.3J	30%	5.5	BW 4	WD < 10	BW 10	< 10 WD
TOETS02 (VT)		*X*		*X*		Blog	4.3L	30%	5.5	BW 6	WD < 10	BW 10	< 10 WD
TOETS03 (VT)		*X*			*X*	Program	4.3K	40%	5.5	BW8	WD > 5	BW 10	< 10 WD

[33] Course choice: CU75072 or CU75020

[34] Course choice: CU75072 or CU75020

CU75069V2	**Title:** *Personal Professional Development: Advanced (PPD-A)*	**Number of study credits:** 8,75	**Contact hours:** 70	**Mandatory:** Yes	**Teaching language:** NL/ENG

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.

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	*X*		*X*		Criterium focused interview	7.2O to 7.2R 7.3C to 7.3G 7.4L to 7.4P 7.5D to 7.5F	95%	5.5	BW 2 or 3 or 4 or 5	< 10 WD	BW 10	< 10 WD
TOETS02 (VT)	*X*	*X*		*X*		Test (English)	7.3H to 7.3J	5%	P/NP[35]	BW 8	< 10 WD	BW 10	< 10 WD

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

Block 7 / Semester 2 – Data Science					
CU75073V1	**Title:** *Data Driven Decision making (DDD)*	**Number of study credits:** 10	**Contact hours:** 50	**Mandatory:** Yes	**Teaching language:** ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	(X)	X		X	X	Portfolio	2.1B,2.1C,2.1D,2.1I,2.4A 6.1A t/m E	30%	5.5	BW6	< 10 workday	BW 10	< 10 workday
TOETS02 (VT)	X	X		X	X	Criteria focused interview	6.2A t/m F,6.3A, 6.3B,6.3C,6.4A t/m D 7.3Q,7.3P, 7.3R, 4.5K	45%	5.5	BW9 or 10	≥5 workdays for resit	BW 10	< 10 workday
TOETS03 (VT)	X	X		X	X	Presentation	7.2D	25%	5.5	BW4 or 5	≥5 workdays for resit	BW 10	< 10 workday

Block 8 / Semester 2 – Data Science					
CU75074V1	**Title:** *Data Science / AI (DSAI)*	**Number of study credits:** 7,5	**Contact hours:** 50	**Mandatory:** Yes	**Teaching language:** ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	X	X	X	X	X	Criteria focused interview	6.1F,6.1G,6.1H,6.2G t/m K,6.3D,6.3E,6.3F,6.4E t/m H 7.3Q,7.3P	80%	5.5	BW8 or 9	≥5 workdays for resit	BW 10	< 10 workday
TOETS02 (VT)	X				X	Presentation (final delivery)	7.3R	20%	5.5	BW8 or 9	≥5 workdays for resit	BW 10	< 10 workday

CU75028V2	**Title:** *Cloud Computing (CCO)*	**Number of study credits:** 5	**Contact hours:** 24	**Mandatory:** Yes[36]	**Teaching language:** ENG

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.

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		Research proposal	3.3A, 3.4A, 3.5A	40%	5.5	BW 4 or 5	WD < 10	BW 10	< 10 WD
TOETS02 (VT)		*X*		*X*		Research report and proof of concept	3.3A, 3.4A, 3.5A	60%	5.5	BW 8 or 9	WD > 5	BW 10	< 10 WD

CU75027V3	**Title:** *Data Visualization (DVI)*	**Number of study credits:** 5	**Contact hours:** 24	**Mandatory:** Yes[37]	**Teaching language:** ENG

Conditions for course participation: *none*

Conditions for test participation: *none*

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.

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	*X*		*X*		Portfolio with optional assessment	1.4A, 1.4B, 1.4C, 1.4D	100%	5.5	BW 8 or 9	WD < 10	BW 10	< 10 WD

[36] Course choice: CU75028 or CU75027

[37] Course choice: CU75028 or CU75027

SPECIALISATIONS

Personality

All students of all tracks have to gain their credits for personality.

CU75075V1	**Title:** *IT Personality Projectweek 3 (PPW3)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[38]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2M	100%	P/NP[39]	CW 43 or 44 or 45 or 46	CW 47	CW 3	CW 5

[38] Mandatory: no, 4 out of 5 from CU75062, CU75063, CU75064, CU75065, CU75075 *(Further information see manual of personality on learn)*
[39] P/NP stands for Passed/Not Passed

CU75062V1	**Title:** *IT Personality 6 (ITP6)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[40]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2L	100%	P/NP[41]	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24

CU75063V1	**Title:** *IT Personality 7 (ITP7)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[42]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2L	100%	P/NP[43]	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24

[40] Mandatory: no, 4 out of 5 from CU75062, CU75063, CU75064, CU75065, CU75075 *(Further information see manual of personality on learn)*
[41] P/NP stands for Passed/Not Passed.
[42] Mandatory: no, 4 out of 5 from CU75062, CU75063, CU75064, CU75065, CU75075 *(Further information see manual of personality on learn)*
[43] P/NP stands for Passed/Not Passed.

CU75064V1	**Title:** *IT Personality 8 (ITP8)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[44]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2L	100%	P/NP[45]	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24

[44] Mandatory: no, 4 out of 5 from CU75062, CU75063, CU75064, CU75065, CU75075 *(Further information see manual of personality on learn)*
[45] P/NP stands for Passed/Not Passed.

CU75065V1	**Title:** *IT Personality 9 (ITP9)*	**Number of study credits:** 1.25	**Contact hours:** 36	**Mandatory:** No[46]	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*	*X*	*X*		Portfolio	7.2L	100%	P/NP[47]	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24	CW 44 or 4 or 15 or 22	CW 46 or 6 or 17 or 24

[46] Mandatory: no, 4 out of 5 from CU75062, CU75063, CU75064, CU75065, CU75075 *(Further information see manual of personality on learn)*
[47] P/NP stands for Passed/Not Passed.

Software Engineering

Semester 5 & 6 – Software Engineering					
CU75033V2	**Title:** *Internship (ISE)*	**Number of study credits:** 25	**Contact hours:** 20	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X	X	X		Portfolio	4.1N,4.2P,4.3O,4.4A,7.1Q	100%	5.5	BW 8 of block 1,2,3 & 4	BW9 of block 1,2,3 & 4	BW10 of block 1,2,3 & 4	< 10 workday

Block 13 / Semester 7 – Software Engineering					
CU75045V1	**Title:** *Modern Programming Practices (MPP)*	**Number of study credits:** 5	**Contact hours:** 15	**Mandatory:** Yes	**Teaching language:** NL
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X	X	X		Portfolio	4.2O,4.3M	100%	5.5	BW 8 or 9	≥5 WD	BW 10	< 10 WD

Block 14 / Semester 7 – Software Engineering					
CU75042V1	**Title:** *Security by Design (SBD)*	**Number of study credits:** 5	**Contact hours:** 15	**Mandatory:** Yes	**Teaching language:** NL
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X		X		Advice report	4.1M,4.3N,4.4B,4.4C	100%	5.5	BW 8 or 9	≥5 WD	BW 10	< 10 WD

Block 13 & 14 / Semester 7 – Software Engineering					
CU75048V2	**Title:** *Graduation Preparation (GPR)*	**Number of study credits:** 5	**Contact hours:** 15	**Mandatory:** Yes	**Teaching language:** NL
Conditions for course participation: *none*					
Conditions for test participation: *The student is allowed to take the test when allowed course participation of CU75047V1*					
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X		X		Graduation proposal	7.5A	50%	P/NP[48]	BW 8 of B13	≥5 WD	BW 8 of B14 or B15 or B16	< 10 WD
TOETS02 (VT)		X		X		Graduation plan	7.5B	50%	5.5	BW 8 of B14	≥5 WD	BW 8 of B13 or B15 or B16	< 10 WD

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

Block 13 & 14 / Semester 7 – Software Engineering					
CU75047V2	**Title:** *Complex Project SE (CPSE)*	**Number of study credits:** 15	**Contact hours:** 100	**Mandatory:** Yes	**Teaching language:** NL

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)[49].*

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.*

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01(VT)	X	X		X	X	Portfolio + assessment	7.1M,7.1N,7.3M 4.1O,4.1P,4.1Q,4.1R,4.2Q,4.2R, 4.2S,4.3P,4.3Q,4.4D	80%	5.5	BW 8 of B14	≥5 WD	BW 8 of B14 or 15 or 16	< 10 WD
TOETS02(VT)	X	X			X	Presentation	7.3L	20%	5.5	BW 8 of B14	≥5 WD	BW 8 of B15,16	< 10 WD

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

Block 15 & 16 / Semester 8 – Software Engineering					
CU75050V1	**Title:** *Graduation Software Engineering (GSE)*	**Number of study credits:** 30	**Contact hours:** 5	**Mandatory:** Yes	**Teaching language:** NL

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.

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01(VT)	X	X		X		Portfolio + assessment	7.1O,7.1P,7.3O 4.1S,4.2T,4.3R,4.4E	80%	5.5	BW7 of block 16 or block 1,2,3,4 in the next year.[50]	≥5 workdays for resit	BW 10 of block 16 or BW 7 in block 1,2,3,4 in the next year[51]	< 10 workday
TOETS02(VT)	X	X		X		Presentation	7.3N	20%	5.5	BW9/10 of block 16 or block 1,2,3,4 in the next year[50]	≥5 workdays for resit	BW 12 of block 16 or BW 9/10 in block 1,2,3,4 in the next year	< 10 workday

[50] One block after the starting block of the course.
[51] At the latest 2 blocks after the starting block of the course.

Data Science

Semester 5 & 6 – Data Science					
CU75034V2	**Title:** *Internship (IDS)*	**Number of study credits:** 25	**Contact hours:** 20	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X	X	X		Portfolio	6.1K,6.2Q,6.3J,6.4K,7.1Q	100%	5.5	BW 8 of block 1,2,3 & 4	BW 9 of block 1,2,3 & 4	BW 10 of block 1,2,3 & 4	< 10 workday

Block 13 / Semester 7 – Data Science												
CU75028V2	**Title:** *Cloud Computing (CCO)*					**Number of study credits:** 5		**Contact hours:** 24		**Mandatory:** Yes[52]		**Teaching language:** ENG
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.*												
Compulsory literature: *none*												
Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		*X*		Research proposal	3.3A, 3.4A, 3.5A	40%	5.5	BW 4 or 5	WD < 10	BW 10	< 10 WD
TOETS02 (VT)		*X*		*X*		Research report and proof of concept	3.3A, 3.4A, 3.5A	60%	5.5	BW 8 or 9	WD > 5	BW 10	< 10 WD

Block 14 / Semester 7 – Data Science												
CU75046V1	**Title:** *Data Management & Governance (DAM)*					**Number of study credits:** 5		**Contact hours:** 15		**Mandatory:** Yes		**Teaching language:** NL / ENG
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.).*												
Compulsory literature: *none*												
Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		*X*		X		Portfolio	6.1I	100%	5.5	BW 8 or 9	≥5 WD	BW 10	< 10 WD

[52] Course choice: CU75028 or CU75027

Block 13 & 14 / Semester 7 – Data Science					
CU75048V2	**Title:** *Graduation Preparation (GPR)*	**Number of study credits:** 5	**Contact hours:** 15	**Mandatory:** Yes	**Teaching language:** NL
Conditions for course participation: *The student is allowed to take the test when allowed course participation of CU75067V1*					
Conditions for test participation: *none*					
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X		X		Graduation proposal	7.5A	50%	**P/NP**[53]	BW 8 of B13	≥5 WD	BW 8 of B14 or B15 or B16	< 10 WD
TOETS02 (VT)		X		X		Graduation plan	7.5B	50%	5.5	BW 8 of B14	≥5 WD	BW 8 of B13 or B15 or B16	< 10 WD

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

Block 13 & 14 / Semester 7 – Data Science					
CU75067V1	**Title:** *Complex Project DS (CPDS)*	**Number of study credits:** 15	**Contact hours:** 100	**Mandatory:** Yes	**Teaching language:** NL
Conditions for course participation: *none* • *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)[54].*					
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01(VT)	X	X		X	X	Portfolio + assessment	7.1M,7.1N,7.3M 4.1O,4.1P,4.1Q,4.1R,4.2Q,4.2R, 4.2S,4.3P,4.3Q,4.4D	80%	5.5	BW 8 of B14	≥5 WD	BW 8 of B14 or B15 or B16	< 10 WD
TOETS02(VT)	X	X			X	Presentation	7.3L	20%	5.5	BW 8 of B14	≥5 WD	BW 8 of B15 or B16	< 10 WD

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

Block 15 & 16 / Semester 8 – Data Science					
CU75049V1	**Title:** *Graduation Data Science (GDS)*	**Number of study credits:** 30	**Contact hours:** 5	**Mandatory:** Yes	**Teaching language:** NL

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.

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01(VT)	X	X		X		Portfolio + assessment	7.1O,7.1P,7.3O 4.1S,4.2T,4.3R,4.4E	80%	5.5	BW7 of block 16 or block 1,2,3,4 in the next year.[55]	≥5 workdays for resit	BW 10 of block 16 or BW 7 in block 1,2,3,4 in the next year[56]	< 10 workday
TOETS02(VT)	X	X		X		Presentation	7.3N	20%	5.5	BW9/10 of block 16 or block 1,2,3,4 in the next year[50]	≥5 workdays for resit	BW 12 of block 16 or BW 9/10 in block 1,2,3,4 in the next year	< 10 workday

[55] One block after the starting block of the course.
[56] At the latest 2 blocks after the starting block of the course.

Business IT Consultant

Semester 5 & 6 – Business IT Consultancy					
CU75035V2	**Title:** *Internship (IBIC)*	**Number of study credits:** 25	**Contact hours:** 20	**Mandatory:** Yes	**Teaching language:** NL/ENG
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X	X	X		portfolio	4.1N,4.2P,4.3O,4.4A,7.1Q	100%	5.5	BW 8 of block 1,2,3 & 4	BW 9 of block 1,2,3 & 4	BW 10 of block 1,2,3 & 4	< 10 workday

Block 13 / Semester 7 – Business IT Consultancy					
CU75044V1	**Title:** *Change, Yes you Can (CYC)*	**Number of study credits:** 5	**Contact hours:** 40	**Mandatory:** Yes	**Teaching language:** NL
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	X			X		Assessment	7.3K	50%	5.5	BW 8 or 9	≥5 WD	BW 10	< 10 WD
TOETS02 (VT)		*X*		X		Report	2.2K	50%	5.5	BW 8 or 9	≥5 WD	BW 10	< 10 WD

Block 13 / Semester 7 – Business IT Consultancy					
CU75043V1	**Title:** *Making Business Intelligent (MBI)*	**Number of study credits:** 5	**Contact hours:** 15	**Mandatory:** Yes	**Teaching language:** NL
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)	*X*	X		X		Portfolio + optional assessments	2.1E,2.1F,2.2C,2.3A,2.3B	100%	5.5	BW 8 or 9	≥5 WD	BW 10	< 10 WD

Block 13 & 14 / Semester 7 – Business IT Consultancy												
CU75048V2	**Title:** *Graduation Preparation (GPR)*					**Number of study credits:** 5		**Contact hours:** 15		**Mandatory:** Yes		**Teaching language:** NL
Conditions for course participation: *none*												
Conditions for test participation: *the student is allowed to take the test when allowed course participation of CU75066V1*												
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.*												
Compulsory literature: *none*												
Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01 (VT)		X		X		Graduation proposal	7.5A	50 %	P/NP[57]	BW 8 of B13	≥5 WD	BW 8 of B14 or 15 or 16	< 10 WD
TOETS02 (VT)		X		X		Graduation plan	7.5B	50 %	5.5	BW 8 of B14	≥5 WD	BW 8 of B13 or 15 or 16	< 10 WD

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

Block 13 & 14 / Semester 7 – Business IT Consultancy					
CU75066V1	**Title:** *Complex Project BIC (CPBIC)*	**Number of study credits:** 15	**Contact hours:** 100	**Mandatory:** Yes	**Teaching language:** NL

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)[58].*

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.*

Compulsory literature: *none*

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01(VT)	X	X		X	X	Portfolio + assessment	7.1M,7.1N,7.3M 2.1H,2.2E,2.3C,2.3D,2.4C,2.5B	80%	5.5	BW 8 of B14	≥5 WD	BW 8 of B14 or B15 or B16	< 10 WD
TOETS02(VT)	X	X			X	Presentation	7.3L	20%	5.5	BW 8 of B14	≥5 WD	BW 8 of B15 or B16	< 10 WD

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

Block 15 & 16 / Semester 8 – Business IT Consultancy					
CU75051V1	**Title:** *Graduation Business IT Consultancy (GBIC)*	**Number of study credits:** 30	**Contact hours:** 5	**Mandatory:** Yes	**Teaching language:** NL
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.*					
Compulsory literature: *none*					

Test code	**Format**					**Assessment type**	**Content**	**Weighting Factor (%)**	**Minimum score**	**Planning test in week**	**Inspection of work in week**	**Resit scheduled in week**	**Inspection of resit in week**
	V	**W**	**O**	**I**	**G**								
TOETS01(VT)	X	X		X		Portfolio + assessment	7.1O,7.1P,7.3O 2.1J,2.2F,2.3E,2.4D,2.5C	80%	5.5	7 of block 16 or block 1,2,3,4 in the next year.[59]	≥5 workdays for resit	BW 10 of block 16 or BW 7 in block 1,2,3,4 in the next year[60]	< 10 workday
TOETS02(VT)	X	X		X		Presentation	7.3N	20%	5.5	9/10 of block 16 or block 1,2,3,4 in the next year[50]	≥5 workdays for resit	BW 12 of block 16 or BW 9/10 in block 1,2,3,4 in the next year	< 10 workday

[59] One block after the starting block of the course.

[60] At the latest 2 blocks after the starting block of the course.

2.2.6 **HZ Personality** (article 3.12 CER HZ Ba ft)

Free composition space is included in the educational program of the ICT program. For the 2021-2022 cohort, this concerns a total of 11.25 ECTS, in accordance with the minimum of 10 credits art. 3.12 OER HZ. In the IT program we name these courses IT personality (ITP).
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 3.10 CER HZ Ba ft)

Cohorts 2017–2018 and newer.
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 2 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.

2.2.8 **Internship** (article 3.9 CER HZ Ba ft)

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 3.8 CER HZ Ba ft)

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.

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

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 3.9 CER HZ Ba ft)
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 Transition arrangement (art. 6.2 paragraph 11 HZ CER)
Transitions of previous years that ended last cohort, are to be handled manually per student.

Old					**New**
Course name	**Short**	**ECTS**	**CU**	**Version**	**Note**
Digital Innovation project	DIP	7,5	75070	1	Tested by User Value Exploration (CU75076) → tests 1 & 3
Digital Transformation project	DTP	5	75071	1	Stays available for testing during 2021-2022
Design Thinking	DTH	2.5	75019	1	Tested by User Value Exploration (CU75076) → test 2

2.3 Study recommendation

2.3.1. **Conditions for registration for programme after NBSA** (article 8.1, paragraph 9 HZ CER Ba ft)
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 Experiment (article 9.4 CER HZ ba ft)

2.4.1 This year, the programme is participating in an experiment under the pilot project group Flexibilisation. The programme would like to experience the results of participation in this project. Students are not affected by this. For further explanation, please see the programme page on HZ Learn.

CHAPTER 3 ESTABLISHMENT

3.1.1 The duration of the implementation regulations is the same as the duration of the HZ Education and Examination Regulations Bachelor programme full-time 2022-2023.

3.1.2 These Course and Examination Regulations were established by the Executive Board on 12/07/2022.

Appendix 1

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	