

# Implementation Regulations CER HZ

## Chapter 1 General provisions Implementation Regulations CER HZ

### 1.1 general

- 1.1.1 The Education and Examination Regulations (CER HZ) comprise the core of the education within HZ. That document gives a general overview of all study programmes offered by HZ. The CER HZ contains institution-specific regulations, which apply to the entire HZ. Every year, the Executive Board determines the institution-specific Implementation Regulations CER HZ (hereinafter: Implementation Regulations) for every study programme.

### 1.2 Programme Committee

- 1.2.1 The Programme Committee is provided the opportunity to advise the Executive Board before the Implementation Regulations are determined.
- 1.2.2 The Programme Committee assesses the execution of the Education and Examination Regulations and the Implementation Regulations annually.

### 1.3 Director

- 1.3.1 The appointed director is responsible for:
- the execution of the CER HZ;
  - the implementation and execution of the Implementation Regulations;
  - 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);
  - preparing the adjustments to the Implementation Regulations..

**Chapter 2 Implementation Regulations CER HZ per study programme: Chemistry, full-time**
**2.1 Registration, pre-training requirements and admission policy**

## 2.1.1 Overview additional pre-training requirements (article 2.3 CER HZ in addition to the requirements as stated in article 2.2 CER HZ)

## Legend

- √ Admissible  
 X Not admissible

Profiles senior general secondary education	NT (Nature & Technology)	NH (Nature & Health)	ES (Economy & Society)	CS (Culture & Society)
Study programme: Chemistry				
Student graduated from senior general secondary school before 1-8-2009	√	√	X	X
Student graduated from senior general secondary school after 1-8-2009	√	√	X	X

Profiles pre-university education	NT (Nature & Technology)	NH (Nature & Health)	ES (Economy & Society)	CS (Culture & Society)
Study programme: Chemistry				
Student graduated from pre-university before 1-8-2010	√	√	X	X
Student graduated from pre-university after 1-8-2010	√	√	X	X

Overview of domains of secondary vocational education (Dutch: *mbo-domeinen*) that do not give direct access to *sectors* of Universities of Applied Sciences (in Dutch: hbo-sector)

- **mbo-domain technics and process industry to sector economics**
- **mbo-domain trade and entrepreneurship to sector health**
- **mbo-domain trade and entrepreneurship to sector technology**
- **mbo-domain economics and administration to sector health**
- **mbo-domain economics and administration to sector technology**
- **mbo-domain health and care to sector economics**
- **mbo-domain food, nature and environment to sector economics**



## Bachelor study programme: Chemistry – Full time

### 2.1.1.1 International enrolment 240 EC track (article 2.2, 2.3 2.8 CER HZ)

- 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. The diploma must, at a minimum, contain the subjects chemistry and mathematics.

### 2.1.1.2 Enrolment 180 EC track (article 2.2, 2.2a, 2.3 2.8 CER HZ)

- Students with a NT and/or NG profile are admissible to the 180 EC VWO programme only if Chemistry, Mathematics B, Physics and Biology were part of the curriculum; both chemistry and mathematics should be finished with a final mark of at least 5.5.
- International students are admissible to the 180 EC VWO programme only if Nuffic has determined that their diploma is equal to the Dutch VWO diploma. The diploma must, at a minimum, contain the subjects chemistry, biology, physics and mathematics.
- Students of the Sabine Blindow Schule Hannover Institute or the IUT Grenoble DUT Chimi are admissible to the 180 EC programme, with a possibility for a request to the Examination Board for exemptions for 2<sup>nd</sup> year courses.

### 2.1.2 Deficiency test (article 2.4 OER HZ)

The holder of a diploma that does not meet the admission requirements (deficiency) (see article 2.1.1.) can 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 Chemistry is an assessment of the knowledge of and skills in Mathematics (B) and Chemistry at 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.

### 2.1.3 Additional requirements (article 2.5 CER HZ)

No additional requirements apply to the Chemistry programme.

### 2.1.4 Admission requirements for the study circle of the part-time study programme (article 2.6. CER HZ)

The Chemistry programme does not have a part-time programme.

### 2.1.5 Admission requirements for the study circle of the dual study programme (article 2.7. CER HZ)

The Chemistry programme does not have a dual programme.

## 2.2 Organisation of the study programme and education, addendum to the certificate

### 2.2.1 Study programme profile, according to DAS profile, version 1.0, June 2013. (article 3.2 CER HZ)

The main focus of the programme is solving problems or answering questions, either individually or in a group, at the molecular level in the fields of chemistry, pharmacy, nutrition and health, generally by conducting experimental research in a laboratory. The use of advanced and often automated equipment is becoming an important aspect of this. It is clear here that information technology, such as the use of advanced software to simulate and optimise chemical processes and the use of bioinformatics (data mining, gene and protein analyses, genomics, proteomics), is becoming increasingly important.

#### Biobased

In the study programme there is a focus on the role and importance of new developments in Biobased Chemistry and Biobased materials. Besides this the students will get familiar with practicals with Biobased sources and materials and learn about developments from oilbased economy to a more sustainable, circular and biobased economy.

## Bachelor study programme: Chemistry – Full time

Chemistry graduates are characterised by analytical, abstract-reasoning, investigative and service skills. This means that Chemistry graduates do not just ask about the 'what' and the 'how' but also about the 'why'. They consequently focus on gaining the insight that will allow them to achieve new developments. Chemistry graduates are able to work in a multidisciplinary environment. In their work they take into account the risks for people and the environment, and base their decisions on the Royal Netherlands Chemical Society's ethics chapter. They work within the legal framework that governs the tasks they are performing, and aim for the most sustainable solution possible. Chemistry graduates always follow the guidelines of a quality system, or they apply the Good Laboratory Practice (GLP) rules to their work.

In the laboratory Chemistry graduates might focus on a particular field, for example, a specialisation within the discipline, fundamental or applied research or the development of laboratory techniques. A few years into their careers they might move on to managerial positions such as project manager or head of department or to positions such as quality manager, equipment manager, instructor/supervisor, IT professional and so on. They could also end up working in the education sector, for example as a teacher or supervisor, or in a commercial position in the private sector. An HBO degree in Chemistry also forms a good basis for an academic programme in, for example, chemistry, biomedical sciences, health sciences, molecular/medical biology. Such a programme can generally be taken in an accelerated form at one of the research universities.

## 2.2.2 Competencies, according to DAS profile, version 1.0, June 2013 (art 3.2 OER HZ)

<b>1 Research</b>	
The Bachelor of Applied Science graduate performs research in the Applied Science domain which either helps to solve a problem or provides greater insight into a subject within his specific working environment.	
<b>1.1</b>	The student performs simple research in response to a supplied problem statement.
1.1a	Communicating with the client on the substance of the assignment (e.g. internal or external client); analysing a given case, formulating a research question and dividing it into subquestions.
1.1b	Clarifying the problem statement (if necessary) in consultation with the client. Setting objectives in consultation with the client on the basis of a simple objective provided.
1.1c	Using supplied literature to clarify the question.
1.1d	Making a work plan/action plan for the assignment in accordance with a supplied protocol (stating goal, organisation, duration and schedule, taking account of safety and environmental rules).
1.1e	Working in accordance with the work plan/ action plan when carrying out the assignment.
1.1f	Playing an active part in a team.
1.1g	Processing and summarising the result of the assignment arithmetically/statistically as necessary, structuring in the light of the research question and presenting it clearly.
1.1h	Reporting orally and/or in writing on the assignment in accordance with specified guidelines.
1.1i	Formulating conclusions from the research results and if necessary submitting a proposal for improving the implementation of the assignment/the research.
<b>1.2</b>	The student translates a problem provided into specific problem statements, chooses a research strategy under supervision.
1.2a	Analysing the problem based on relevant sub-questions and accounting for the chosen research strategy.
1.2b	Formulating sub-questions from the research to be carried out. Analysing objectives in consultation with the client and converting them into the required research.
1.2c	Selecting sources and using them to study the research question in depth.
1.2d	Making a work plan in consultation with the client, designing on his own an approach to the conduct of the research, taking account of QSE, etc.
1.2e	Working in accordance with the work plan when carrying out the assignment. Implementing the work plan efficiently and updating it as necessary in between times.
1.2f	Acting as a full team member in his own work environment (through reflection and feedback).
1.2g	Summarising and interpreting the full or partial results in relation to the assignment/ research question.
1.2h	Combining the full or partial results into one report in accordance with the applicable guidelines/ standard.
1.2i	Making a proposal for follow-up steps based on the combination of partial results.
<b>1.3</b>	The student conducts an experiment according to a protocol.
1.3a	Accounting for the chosen research strategy.
1.3b	Making proposal(s) on the strategy and implementation to be followed.
1.3c	Using relevant criteria to gauge the reliability of sources.
1.3d	Drafting a work plan on his own and giving reasons for the constraints it contains.
1.3e	Implementing the work plan effectively and efficiently and updating it as necessary in between times.
1.3f	Depending on the nature of the assignment, acting as a full member and collaborating in a team which also contains staff from other professional field(s).
1.3g	Logically and clearly combining the full or partial results and drawing conclusions in relation to the research question.
1.3h	Reporting on the research in accordance with the standard applicable in the professional field.
1.3i	Formulating a strategy for follow-up research; making a proposal for follow-up steps based on an analysis of results.

## 2 Experimentation

The Bachelor of Applied Science graduate conducts experiments in the Applied Science domain in a way that ensures that demonstrably reliable results are obtained.

2.1	The student conducts an experiment according to a protocol.
2.1a	Explaining, when asked, the purpose of the experiment.
2.1b	By explaining, when asked, the principle of the method used.
2.1c	Operating equipment according to instructions.
2.1d	Properly preparing an experiment on the basis of a protocol, conducting it and obtaining a result within the specified time in accordance with safety and environmental rules.
2.1e	Carrying out a protocol in accordance with safety instructions.
2.1f	Processing measurement results properly and correctly and assessing whether a result obtained is realistic.
2.1g	Keeping an accurate and well organised lab journal.
2.1h	Making a proposal if necessary to improve the performance of a protocol.
2.1i	Scheduling the work to be done out on a lab day or part-day to ensure that it can be performed efficiently.
2.2	The student chooses a suitable protocol, adjusts it as necessary and carries it out.
2.2a	Choosing a protocol and explaining why it is suitable for the experiment.
2.2b	Assessing the suitability of methods and protocols and resolving experimental problems (troubleshooting).
2.2c	Assessing the suitability of available equipment and, if necessary, making adjustments.
2.2d	Preparing a work schedule for carrying out a protocol to assess safety and environmental aspects and implementing it and obtaining reproducible results within the specified time.
2.2e	Assessing the environmental and safety aspects of a protocol.
2.2f	Assessing the reliability of a result on the basis of statistical considerations.
2.2g	Keeping an accurate and well organised lab journal and recording proper conclusions from the experimental results in the lab journal.
2.2h	Making proposals to improve the protocol.
2.2i	Scheduling the experimental work to be performed within a specific project which is time-limited (a few weeks).
2.3	The student sets up experiments under supervision and conducts them unsupervised in a systematic way.
2.3a	Translating a general procedure or predetermined synthesis objective into (a) work instruction(s) and combining multiple methods into a test setup.
2.3b	Choosing methods and techniques and anticipating possible experimental problems.
2.3c	Taking account of possibilities and limitations of the equipment to be used when setting up and conducting experiments.
2.3d	Preparing a schedule for a number of experiments, conducting them and obtaining reproducible results within the specified time.
2.3e	Taking account of environmental and safety aspects in the test setup and communicating with his colleagues about it.
2.3f	Choosing a statistical or other method for assessing the reliability of the result obtained.
2.3g	Keeping an accurate and well organised lab journal with proper conclusions and taking responsibility for the results obtained in the report.
2.3h	Making proposals to improve the protocol and if necessary proposing methods for follow-up experiments.
2.3i	Scheduling the setting up and performance of experimental work within a project of longer duration (at least six months, as stated in the graduation project), where regular adjustment of the schedule is required in line with progress.

## 4 Management and coordination

The Bachelor of Applied Science graduate develops, implements and maintains a management system or parts thereof to ensure that the system conforms to the relevant legislation and quality standards and the organisation's norms and values.

4.1	The student checks the work against the requirements of different management systems.
4.1a	Identifying and noting actual or potential problems in implementing a management system.
4.1b	Reviewing the options for improving the implementation of a management system.
4.1c	Showing that he is familiar with relevant legislation.
4.1d	Fitting his activities into the management system used at his place of employment.
4.1e	Reporting on compliance with the guidelines for the management systems used when carrying out his activities.
4.1f	Providing, on request, information for employees on the implementation of the management system used.





## Bachelor study programme: Chemistry – Full time

**5 Advice, procurement and sales**

The Bachelor of Applied Science graduate provides properly substantiated advice on the design, improvement or use of products, processes and methods and effects profitable transactions involving products or services within the Applied Science

5.1	The student familiarises himself with users' problems and/or requirements.
5.1a	Listening to the customer.
5.1b	Describing the assignment clearly and unambiguously.
5.1c	Analysing market research data.
5.1d	Specifying actions to follow a piece of market research.
5.1e	Acknowledging the requirements of the customer/client or user as a relevant technical problem.
5.1f	Knowing the customer/client or user.
5.1g	Identifying different negotiating techniques.

**6 Instruction, supervising, teaching and coaching**

The Bachelor of Applied Science graduate instructs and supervises employees and customers while teaching new knowledge and skills within the Applied Science domain.

6.1	The student passes his own knowledge and skills, on request, to employees (by demonstrating and explaining).
6.1a	Helping to provide fellow employees, students or trainees with instructions/demonstrations with regard to a practical test, etc.
6.1b	Helping to supervise employees, trainees, students or course participants in the use of methods and equipment, etc.
6.1c	Explaining things clearly.
6.1d	Being aware of the importance of continuously developing his expertise.
6.1e	Providing feedback, on request, on the evaluation/ assessment of the results of instructions, etc.

**7 Leadership and managing people**

The Bachelor of Applied Science graduate provides direction and guidance for organisational processes and the employees involved in them in order to achieve the goals of the division/department or the project which he is managing.

7.1	The student provides employees with assistance and guidance when asked to do so.
7.1a	Showing that he understands the place and role of his part of the organisation (internship/graduation project)
7.1b	Helping to allocate tasks and work.
7.1c	Being approachable and accessible for employees, fellow students and lecturers.
7.1d	Being honest and reliable towards employees, fellow students and lecturers.
7.1e	Supporting others in their initiatives.
7.1f	Contributing to staff and progress meetings on the basis of his own work.
7.1g	Giving a clear and unambiguous explanation or instructions about a task to be performed.
7.1h	Giving employees an insight into the importance of the constraints of the project.

**8 Self-management**

The Bachelor of Applied Science graduate manages himself in performing his duties and in his development and ensures that he is up to date with the latest developments in terms of knowledge and skills and in terms of ethical dilemmas and socially

8.1	The student reflects on his own performance.
8.1a	Working towards an established learning objective. Discussing the learning strategy and the ensuing results; being aware of the function of a learning objective and how to use it in his learning strategy.
8.1b	Identifying any need to adjust his own performance in the academic environment.
8.1c	Communicating with others about professional and ethical dilemmas and identifying professional and ethical dilemmas.
8.1d	Seeking information in order to improve his own performance.
8.1e	Critically evaluating his own actions and thinking. Being aware of the effect of his own attitude to work on others and on group members in the case of a project.
8.2	The student reflects on his own performance and development.
8.2a	Determining his own learning objective and learning strategy in consultation/without assistance and reflecting on the result.
8.2b	Using feedback on his own performance to adapt to the working environment.
8.2c	Taking note of any professional and ethical dilemmas and giving his opinion on them.
8.2d	Taking on board criticism of work delivered and discussing his own performance with colleagues.
8.2e	Drawing conclusions on his actions and if necessary articulating them to others.

Bachelor study programme: Chemistry – Full time

2.2.3 Organisation study programme (article 3.3, 3.13, CER HZ)

Organisation of the study programme:	
National name:	Chemie
International name:	Chemistry
Degree:	Bachelor of Science
Duration of study:	4 years
Study load propedeutic phase	60 EC
Study load main phase:	180 EC
Form:	Full-time
Croho-code:	34396
Location:	Vlissingen
Languages:	Dutch & English
Date start accreditation:	30-11-2017
Final date accreditation:	29-11-2023
Associate degree:	-
Combined study programma:	-
Accelerated course higher professional education (pre-university)	Yes

2.2.4 **Programme regular track 240 EC**

Note

S: semester

Block: ½ semester (= quarter)

AC: Applied Chemistry

LS: Life Science

## Bachelor study programme: Chemistry – Full time

Semester	Block	CourseID	EC	Title
S1	01 Food Chemistry	CU20624V1	5	Chemistry 1 and Microbiology 1
		FCC1	1.25	Free composition course semester 1
		CU76012	2.5	Mathematics 1 - Basics
	02 Quality Control	CU20623V2	5	Beer Chemistry
		CU20627V1	5	Chemistry 2 and Microbiology 2
		CU20637V1	1.25	Professionalization block 1 & 2
		CU76013	2.5	Physics
		CU76014	2.5	Quality & Safety
		CU20626V2	5	Pool Chemistry
		CU20630V1	5	Organic Chemistry 1 & Cell biology 1
S2	03 Oil- and Biorefinery	FCC2	1.25	Free composition course semester 2
		CU20631V2	2.5	Biobased Products & Economy
		CU20632V1	5	Biologically Active Compounds
	04 Health & Chemistry	CU20633V1	5	Organic Chemistry 2 & Cell biology 2
		CU20638V1	1.25	Professionalization block 3 & 4
		CU76015	2.5	Data analysis 1
		CU76016	2.5	Mathematics 2 - Differentiate & Integrate
		CU24063	5	Environmental Chemistry & Toxicology
		CU24064	5	Spectroscopy 1 & Toxicology
		FCC3	1.25	Free composition course semester 3
S3	05 Environmental Chemistry & Toxicology	CU76017	2.5	English 1
		CU76018	1.25	Statistics 3
		CU24067	5	Bio-organic Toolbox
		CU24068	5	Organic chemistry 3 and Biochemistry 1
		CU24070	1.25	Professionalization block 5 & 6
		CU76019	3.75	Spectroscopy 2
		CU24074	5	Forensic Science
	07 Forensic Science	CU24075	5	Spectroscopy 3 / Separations1 & DNA 1
		FCC4	1.25	Free composition course semester 4
		CU76020	2.5	English 2
CU76021		1.25	Statistics 4	
CU24077		5	Marine Biobased Specialties	
CU24078		5	MBBS - Lectures & Tutorials	
CU24080		1.25	Professionalization block 7 & 8	
S4	08 Marine Biobased Specialties	CU76022	2.5	Student assistant
		CU76023	1.25	Labmanagement & Safety
		CU13633V5	2.5	Professionalization block 9 & 10
		FCC5	1.25	Free composition course semester 5
		FCC6	1.25	Free composition course semester 6
		CU76000	5	Chromatography practice
S5 - AC	09 Specialisation Applied Chemistry I	CU76001	5	Polymer chemistry & analysis
		CU76002	2.5	Circular Chemistry
		CU76006	5	Circular Chemistry practice
	10 Specialisation Applied Chemistry II	CU76007	5	Advanced Chromatography
		CU76008	2.5	Circular chemistry & Biopolymers
		CU13415V6	2.5	Bioinformatics
		CU76003	5	Immunology practice
		CU76004	5	Immunology 1 & Biochemistry 2
S5 - LS	09 From Molecules & Cells to Human Health	CU13416V6	2.5	Biotechnology
		CU76009	5	Molecular Biology toolbox
		CU76010	5	Immunology 2 & DNA 2
	10 Achievements & Challenges of Life Scienc	FCC7	1.25	Free composition course semester 7
		CU05600V12	30	Research minor
		FCC8	1.25	Free composition course semester 8
S6	Minor	CU06725V17	27.5	Internship in company
S7	Internship	CU06726V15	30	Final Thesis & project
S8	Final thesis			

## 2.2.5 Programme regular track 180 EC

See 2.2.3, programme regular track 240 EC, semester 3 to 8. Semester 3 and 4 is the propaedeutic level.

## 2.2.6 Language

## Bachelor study programme: Chemistry – Full time

The study programme adheres to the following rules with regard to the language:

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.

2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year: The language of instruction and examining is English, with the exception of the work placement / graduation phase at the request of the work placement company / company where the student completes his graduation.

### 2.2.7 Resit Practicals

No later than two weeks prior to the start of a semester, the student must indicate by means of a resit form which practicals from a previous study year he wishes to take again. If the resit form has not been submitted, the student loses his right to the first resit of a practical exam.

Resit practicals during the study year

In accordance with the CER, the programme of Chemistry provides 2 possibilities of examination for each exam. This includes the practical exams as well. Taking into consideration the organisational complexity of practicals, these resits are regulated. Resits of a practical will be planned in the resit week of the current quarter.

The precise rules for every course/practical are described in the course description.

Guidelines for the rules:

- All practical resits of the first and second semester will be planned during resit period of the current quarter.
- There could be several reasons why a student fails a practical. The rules for resits differ for each case.
  - a. Insufficient attendance. Attendance at a practical is mandatory. If the student fails to attend the practical due to circumstances beyond his control, the teacher and the student could agree upon an arrangement specifically for the practical. For instance, allowing the student to attend another, parallel, practical group. If there are no circumstances beyond his control, the student must retake those parts of the practical during the resit week of the current quarter.
  - b. Insufficient report. A student is allowed to redo a report for which the teacher determines the deadline. If the product remains insufficient, even after the resit, the student must retake the entire practical in the next study year.
  - c. Insufficient work place assessment: For every practical, it will be indicated if the student must retake the original practical during the resit week of the current quarter.

It is not possible to resit laboratory activities of the research minor, internship and graduation phase during the current semester. The student will receive ample feedback by means of interim evaluations to improve his/her performance. Should the feedback be insufficiently effective, the student could be asked to discontinue the practical work and retake a specific part during the next semester. This will be decided following consultation with the teacher/supervisor, SCC and OLC.

### 2.2.8 Regular and alternative programme

In the regular programme, the minor is programmed in the 6<sup>th</sup> semester and the internship in company in the 7<sup>th</sup> semester. In the alternative programme, the internship in company is programmed in the 6<sup>th</sup> semester and the minor in the 7<sup>th</sup> semester.

Bachelor study programme: Chemistry – Full time

**2.2.9 Supplement validity test results (article 6.7.1, CER HZ)**

This limitation of the validity period is not applicable on results achieved for practicals work.

**2.3 Courses propaedeutic phase (article 3.5, 3.11 CER HZ)**

Abbreviations used in the course tables:

O	Oral exam
W	Written exam
OT	Other test
I	Individual test
G	Group assessment

**Semester 1 – Block 1 – Food Chemistry**

<b>CU20623V2</b>	<b>Title:</b> Beer Chemistry					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Together as a learning team you are going to brew beer. You can choose between two kinds of beers, i.e. a black gold and a white beer. After the brewing process, which takes two weeks, you will bottle the beer and store it and subsequently perform various chemical and microbiological analysis. The course will be completed by a beer brewing contest. Besides beer brewing we provide you with the most important practice of your career in chemistry: how to work in a safe way, how to perform a weighing on an (analytical) balance and how to transfer volumes within a certain precision. In addition you are introduced to titration techniques and the use of primary and secondary standards. By titration you will determine the alcohol content of your own brewed beer. Furthermore you will be learned how to use a spectrophotometer to determine the colour unit of your beer. You will learn various ways to identify and count microorganisms, i.e. by prepare a growth medium and via inoculation making a pure culture. In addition you will perform fermentation tests. During the practical's you report all observations and obtained data in your lab journal according the guidelines and you will be learned how to keep up a laboratory journal. During most practical's you work in couples and is communication essential to be successful. The teacher will motivate you to communicate and to approach													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual workplace assessment	2.1a, 2.1b, 2.1c, 2.1d, 2.1e, 2.1f, 2.1g, 1.1f, 1.1h	100%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU20624V1</b>	<b>Title:</b> Chemistry 1 and Microbiology 1					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Basic microbiological concepts and techniques are taught in context of food sciences. Understanding of microbial physiology is key in fully comprehending the relationship between microbes and food.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Chemistry 1	2.1a, 2.1b, 2.1f	50%	5.5	42	43	44	46
2		X		X		Individual written exam Microbiology 1	2.1a, 2.1b, 2.1f	50%	5.5	42	43	44	46



<b>CU76012</b>	<b>Title:</b> HZ Personality, Free Composition Course 1					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 2	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU76012</b>	<b>Title:</b> Mathematics 1 – Basics					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 7	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> 70% of selected exercises in Aleks completed.													
<b>Course summary:</b> Elementary mathematics: expanding forms (removing brackets), factorising forms. Basic algebra: Understanding and solving linear, quadratic and exponential (the number e, logarithms) equations. Basic trigonometry: definition of sine and cosine.  The course will be relying heavily on self-study in the online environment of Aleks. A weekly Q&A session will be planned at HZ for support. Credits will be only be allocated upon completion of 70% of the associated exercises in Aleks.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Math 1	2.1b, 2.1f	100%	5.5	42	43	44	46

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**Semester 1 – Block 2 - Quality Control**

<b>CU20626V2</b>	<b>Title:</b> Pool chemistry					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Maybe you have visited a swimming pool many times, but do you know how swimmers pollute their own swimming water? Think about “pee in the pool”, perfumes, sweat, body lotion. In this course you will monitoring the chemical and microbiological parameters of a local swimming pool. Questions as how do they react with chlorine, how do these products affects our health and which kind of bacteria in swimming pools can cause serious health effects will be studied.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual workplace assessment	2.1a, 2.1b, 2.1c, 2.1d, 2.1e, 2.1f, 2.1g, 1.1f, 1.1h	100%	5.5	45 to 51	45 to 51	46 to 2	4

<b>CU20627V1</b>		<b>Title:</b> Chemistry 2 and Microbiology 2					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN			
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Basic microbiological concepts are taught in relation to water quality and hygiene. The course focuses on infectious diseases, diagnostic detection, prevention, and treatment.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Chemistry 2	2.1a, 2.1b, 2.1d, 2.1f	50%	5.5	2	3	4	6
2		X		X		Individual written exam Microbiology 2	2.1a, 2.1b, 2.1d, 2.1f	50%	5.5	2	3	4	6

<b>CU76013</b>	<b>Title:</b> Physics					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> In order to understand equipment in the laboratory we teach about light. We begin with harmonic oscillation and waves. Other topics: Light as a(n electromagnetic) wave, Snel's Law, Lenses and microscope, Lambert-Beer's Law and Polarisation.  Electrostatics: understand what is an electrical field and electrical tension (voltage) and Coulomb's Law. Useful to understand molecular models. Electrical currents: Ohm's law. Serial and parallel circuits. The difference between current and voltage. Electrical power. Magnetism: The Lorentz Force. Bending of charged particles in a magnetic field. The magnetic induction of a coil and a wire.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Physics	2.1b, 2.1f	100%	5.5	2	3	4	6

<b>CU76014</b>	<b>Title:</b> Quality & Safety (Q&S)					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 24	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Attendance of scheduled class activities are mandatory (80%).													
<b>Course summary:</b> Before you can carry out an experiment in a lab, you will need to ask yourself two important questions: (1) How do I ensure that the experiment is conducted safely (people and environment)? (2) How do I ensure that my results are reliable?													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review (< 10 workdays after grade is received)	Planning resit in week	Review resit in week	
	O	W	O T	I	G								
1			X	X		Individual practical exam	2.1d, 2.1e, 2.1f	100%	5.5	51	2	4	6

<b>CU20637V1</b>		<b>Title:</b> Professionalization block 1 & 2				<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 10	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Attendance is mandatory. In case of ((un)foreseen, inevitable) absence, students have to contact their study coach.													
<b>Course summary:</b> Assignments, individual and as a group to work on personal professional skills and knowledge of the students competencies to develop toward a professional chemistry employee.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	O T	I	G								
1	X	X		X		Individual reflection block 1 & 2	8.1a, 8.1b, 8.1d, 8.1e	100%	5.5	2	3	4	6

**Semester 2 – Block 3 - Oil- and Biorefinery**

<b>CU20629V1</b>	<b>Title:</b> Oil- and Biorefinery					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<p><b>Course summary:</b> Did you wonder how long this planet can provide for fossil fuels? What other sources are available? Which role do chemists have in this particular topic? In this course you will get familiar with chemical techniques for distillation, synthesizing biochemical compounds, alternatives for fuel, yield and other bio based related chemical methods. 3 methods will be practiced: synthesizing, extraction and conversion of chemical compounds. A strong focus will be held on safety, lab preparation and accuracy of work. Workplace assessment will focus on prelabs, use of labjournal, understanding goals and teamwork attitude. A assessment form will be provided beforehand.</p>													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review (< 10 workdays after grade is received)	Planning resit in week	Review resit in week	
	O	W	O T	I	G								
1	x			X		Individual workplace assessment	2.1c, 2.1d, 2.1e, 2.1g, 1.1f	50%	5.5	5 to 12	6 to 13	7 to 14	16
2		X			X	Reporting	2.1a, 2.1b, 2.1f, 1.1h	50%	5.5	5 to 12	6 to 13	7 to 14	16



<b>CU20630V1</b>	<b>Title:</b> Organic Chemistry 1 & Cell biology 1					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<p><b>Course summary:</b> A large component of this course is organic chemistry. This field is of a major importance, since it is the basis of combinations/reactions between chemicals and leading to the existence of new chemicals. Organic chemistry is related to all fields of chemistry such as: food, environment, pharmaceuticals but also petroleum industry. Biochemistry, on the other hand, relates the organic chemistry to biological components. When thinking of Biochemistry, you may think of: fatty acids, (bio) oils, enzymes, amino acids present in chemical drop-ins used in diverse industries.</p> <p>This course is a theoretical component of the (practical) course CU20629, adding depth to your organic chemistry knowledge, learned previously about: industrial distillation of fossil fuels; naming structures according to IUPAC regulations, chemical bonding in organic molecules. Functional group reactivity is explored starting with electrophilic addition to alkenes and alkynes. The concept of stereochemistry is also explored.</p>													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Organic Chemistry 1	2.1b, 2.1f, 2.1h	50%	5.5	13	14	15	17
2		X		X		Individual written exam Cell biology 1	2.1a, 2.1b, 2.1f	50%	5.5	13	14	15	17

<b>CU76012</b>	<b>Title:</b> HZ Personality, Free Composition Course 2					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 2	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU20631V2</b>	<b>Title:</b> Biobased Products & Economy					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<p><b>Course summary:</b> Suppose you are asked to produce (Synthesize) a chemical that would bring you a lots of money , but, it will produce a lots of chemical waste. You have a dilemma: do you choose for yourself and for your company (providing jobs and selling the product making profit) or you choose for saving the planet by generating less waste by not producing the product ? This problem is a matter of ethics. Green- or Biobased chemistry, in particular renewable chemistry, creates the opportunity to improve the current earth impact of consumerism while offering a horizon of business benefit to the chemicals industry.</p> <p>This course is a link to the previous courses from this quarter (CU20629 and CU20630) learning you the basis of ethics, statistics, yield, biobased chemistry (lectorate), economics. In this course you will practice the statistics/mathematics evolved to help you evaluate the results from the course CU20629.</p>													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X			X	Individual written assignment	2.1h, 1.1c, 8.1c, 1.1g	100%	5.5	12	14	15	17

**Semester 2 – Block 4 - Health & Chemistry**

<b>CU20632V1</b>	<b>Title:</b> Biologically Active Compounds					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> The course focuses on the synthesis and purification of biologically active compounds. They are subsequently tested for their activity in several bioassays.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual workplace assessment	2.1c, 2.1d, 2.1e, 2.1f, 2.1g, 1.1f	50%	5.5	16 to 23	17 to 24	25	27
2		X			X	Reporting	2.1a, 2.1b, 2.1f, 1.1h	50%	5.5	16 to 23	17 to 24	25	27

<b>CU20633V1</b>	<b>Title:</b> Organic Chemistry 2 & Cell Biology 2					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Key aspects in relation to diseases are discussed in the cell biology part; cell cycle (de)regulation, cancer, meiosis, development, and nerve system. The journey through organic chemistry in commenced with the concept of electron delocalization and resonance structures, reactions of alkyl halides, alcohols, epoxides and ethers.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Organic Chemistry 2	2.1a, 2.1b, 2.1d, 2.1f	50%	5.5	24	25	26	28
2		X		X		Individual written exam Cell Biology 2	2.1a, 2.1b, 2.1d, 2.1f	50%	5.5	24	25	26	28

<b>CU76015</b>	<b>Title:</b> Mathematics 2 - Differentiate & Integrate					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b>  Introduction to differentiation and integration. Part 1: Differentiation: More theory about functions (inverse functions etc), Limits, The first derivative as an limit and as the slope a of a tangent line, Finding the equation of a tangent line, Finding extreme values of a function and Second derivative of a function and inflection points. Part 2: Integration: Integration as the area under a graph, Integral without borders as reverse of differentiation, Integration with substitution and Partial integration.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Mathematics 2	2.1b, 2.1f	100%	5.5	24	25	26	28

<b>CU76016</b>	<b>Title:</b> Data analysis 1					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Before you can carry out an experiment in a lab, you will need to ask yourself two important questions: (1) How do I ensure that the experiment is conducted safely (people and environment)? (2) How do I ensure that my results are reliable? One of the essential tools to give evidence that your results are reliable is statistics. In this course you will process your laboratory data with the help of a spreadsheet program. Major topics: measures of location and spread (mean standard deviation, variance), normal distributions (samples and populations), confidence limits and intervals, principles of significance testing (one-sided and two-sided), applications of the t-test for comparing means, F-test for comparing variances, testing for outliers and the chi-squared test.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam data 1	2.1b, 2.1f	100%	5.5	24	25	26	28

<b>CU20638V1</b>	<b>Title:</b> Professionalization block 3 & 4					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 10	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Attendance is mandatory. In case of ((un)foreseen, inevitable) absence, students have to contact their study coach.													
<b>Course summary:</b> Assignments, individual and as a group to work on personal professional skills and knowledge of the students competencies to develop toward a professional chemistry employee.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1	X	X		X		Individual reflection block 3 & 4	8.1a, 8.1b, 8.1d, 8.1e	100%	5.5	24	25	26	28



## 2.4 Courses main phase (article 3.5, 3.11 CER HZ)

**Semester 3 – Block 5 – Environmental Chemistry & Toxicology**

<b>CU24063</b>	<b>Title:</b> Environmental Chemistry & Toxicology					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 64	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> The course focuses on the chemical and toxicological aspects of water quality.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual workplace assessment	2.1c, 2.1d, 2.1e, 2.1f, 2.1g, 1.1f	50%	5.5	35 to 41	35 to 41	36 to 42	43
2		X			X	Reporting	2.1a, 2.1b, 2.1f, 1.1h	50%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU24064</b>	<b>Title:</b> Spectroscopy 1 & Toxicology					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Guest-lectures are mandatory and part of the course Prof 5&6.													
<b>Course summary:</b> The toxicology part addresses the interactions between toxicants and organisms at different levels; ecological, organismal, cellular, and molecular. Important topics include dose-response effects, organ dysfunction, ecology, heavy metals, pesticides, carcinogenesis, genetic alterations, and biotransformation. The water treatment has as goal to help you learn how to prepare and study for the practical. Self-study and co-operation is very relevant here, this part is in relation to the practical Environmental Chemistry & Toxicology . Spectroscopy 1 covers (among others) techniques used in the practical Environmental Chemistry & Toxicology. It has as goal to help you understand the steps involved in method development of the existed protocols. Reading of NEN and ISO norms as well as other materials is of a relevant part.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Water treatment & spectroscopy 1	2.1a, 2.1b, 2.1f	50%	5.5	42	43	44	46
2		X		X		Individual written exam Toxicology	2.1a, 2.1b, 2.1f	50%	5.5	42	43	44	46

<b>CU76012</b>	<b>Title:</b> HZ Personality, Free Composition Course 3					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 2	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU76017</b>	<b>Title:</b> English 1					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Professionalization on English language.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Exam English 1	2.1b, 2.1f	100%	5.5	42	43	44	46

<b>CU76018</b>	<b>Title:</b> Statistics 3					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 14	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> This course is a follow-up course of statistics 1 and 2 and focus on the calibration methods in instrumental analysis: regression and correlation. Major topics of this course are correlation coefficient, errors and confidence limits in linear calibration, limits of detection, standard addition, weighted regression and outliers in regression.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
2		X		X		Individual written exam Statistics 3	2.1b, 2.1f	100%	5.5	42	43	44	46

**Semester 3 – Block 6 - Bio-organic Chemistry**

<b>CU24067</b>	<b>Title:</b> Bio-organic Chemistry					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> This course highlights several common laboratory techniques in organic synthesis and biochemical processes, such as electrophoresis, protein-extraction, starch-isolation, steam distillation, TLC, Grignard reactions, purification techniques and analytical techniques (IR spectroscopy).													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual workplace assessment	2.1c, 2.1d, 2.1e, 2.1f, 2.1g, 1.1f	50%	5.5	45 to 51	45 to 51	46 to 2	4
2		X			X	Reporting	2.1a, 2.1b, 2.1f, 1.1h	50%	5.5	45 to 51	45 to 51	46 to 2	4

<b>CU24068</b>	<b>Title:</b> Organic chemistry 3 and Biochemistry 1					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Guest-lectures are mandatory and part of the course Prof 5&6.													
<b>Course summary:</b> The course provides the necessary theoretical knowledge for the practical (CU24067). The organic chemistry part is a continuation of the organic chemistry of courses CU20630 and CU20633. Topics: organometals, reactions of benzene and benzene derivatives and carbonyl chemistry. Biochemistry topics: Properties polysaccharides, properties proteins, enzyme kinetics.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Organic Chemistry 3	2.1a, 2.1b, 2.1f	50%	5.5	2	3	4	6
2		X		X		Individual written exam Biochemistry 1	2.1a, 2.1b, 2.1f	50%	5.5	2	3	4	6

<b>CU76019</b>	<b>Title:</b> Spectroscopy 2					<b>Number of EC's:</b> 3.75	<b>Contact hours:</b> 42	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Guest-lectures are mandatory and part of the course Prof 5&6.													
<b>Course summary:</b> The theory behind spectroscopic techniques (MS, IR and NMR) are explained. Exercises involve structure determination by assessing simulated spectra.													
Exam no.	Form					Contents	Weighting Factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Spectroscopy 2 exam	2.1b, 2.1f	100%	5.5	2	3	4	6

<b>CU24070</b>	<b>Title:</b> Professionalization block 5 & 6					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 10	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Attendance is mandatory. In case of ((un)foreseen, inevitable) absence, students have to contact their study coach.													
<b>Course summary:</b> Assignments, individual and as a group to work on personal professional skills and knowledge of the students competencies to develop toward a professional chemistry employee.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	O T	I	G								
1	X	X		X		Individual reflection block 5 & 6	8.1a, 8.1b, 8.1d, 8.1e	100%	5.5	2	3	4	6

**Semester 4 – Block 7 – Forensic Science**

<b>CU24074</b>	<b>Title:</b> Forensic Science					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 64	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Introduction on basics of forensic practicals and forensic analytical methods													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review (< 10 workdays after grade is received)	Planning resit in week	Review resit in week	
	O	W	O T	I	G								
1	x			X		Individual workplace assessment	2.1c, 2.1d, 2.1e, 2.1g, 1.1f	50%	5.5	5 to 12	6 to 13	7 to 14	16
2		X			X	Reporting	2.1a, 2.1b, 2.1f, 1.1h	50%	5.5	5 to 12	6 to 13	7 to 14	16



<b>CU24075</b>	<b>Title:</b> Spectroscopy 3 / Separations1 & DNA 1					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Guest-lectures are mandatory and part of the course Prof 7&8.													
<b>Course summary:</b> The course provides theoretical backgrounds of forensic science and analytical techniques related to chemical profession.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual written exam Spectroscopy 3 / Separations1	2.1b, 2.1f, 2.1h	50%	5.5	13	14	15	17
2		X		X		Individual written exam DNA techniques	2.1a, 2.1b, 2.1f	50%	5.5	13	14	15	17

<b>CU76012</b>	<b>Title:</b> HZ Personality, Free Composition Course 4					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 2	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU76020</b>	<b>Title:</b> English 2					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Professionalization on English language.													
Exam no.	Form					Contents	Weighting Factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		English 2 exam	2.1b, 2.1f	100%	5.5	13	14	15	17

<b>CU76021</b>	<b>Title:</b> Statistics 4					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 14	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> This course is a follow-up course of statistics 1,2 and 3 and focus on the quality of analytical measurements. Major topics of this course are sampling, ANOVA, quality control, control charts (Shewhart charges) and proficiency testing scheme.													
Exam no.	Form					Contents	Weighting Factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Statistics 4 exam	2.1b, 2.1f	100%	5.5	13	14	15	17

**Semester 4 – Block 8 - Marine Biobased specialties**

<b>CU24077</b>	<b>Title:</b> Marine Biobased specialties					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 64	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> This course focuses on the students practical research skills, which included dynamics of teamwork, finding and citing published information, and experimental design. The course is in close cooperation with the research group Marine Biobased Specialties and will include their research subjects. Includes separation techniques.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual workplace assessment	2.1c, 2.1d, 2.1e, 2.1f, 2.1g, 1.1f	50%	5.5	16 to 23	17 to 24	25	27
2		X			X	Reporting	2.1a, 2.1b, 2.1f, 1.1h	50%	5.5	16 to 23	17 to 24	25	27

<b>CU24078</b>	<b>Title:</b> Theory Marine Biobased Specialities					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Guest-lectures are mandatory and part of the course Prof 7&8.													
<b>Course summary:</b> This course focuses on the students practical research skills, which included dynamics of teamwork, finding and citing published information, and experimental design. The course is in close cooperation with the research group Marine Biobased Specialities and will include their research subjects.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Individual oral exam AC	2.1a, 2.1b, 2.1d, 2.1f	50%	5.5	24	25	26	28
2		X		X		Individual written exam <b>Sep2 and Bch3</b>	2.1a, 2.1b, 2.1d, 2.1f	50%	5.5	24	25	26	28

<b>CU76022</b>	<b>Title:</b> Student assistant					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> -	<b>Mandatory:</b> Yes	<b>Language:</b> EN			
<b>Conditions for participation:</b> none												
<b>Special condition for credit allocation:</b> none												
<b>Course summary:</b> This work often involves informing colleagues, visitors or business contacts about a company, activities and results. For example, you may need to show new colleagues the ropes, explain how to operate a piece of equipment or how an analysis method works, or instruct them on a new or optimised work process. The objective of this course is to gain experience in instructing, teaching and supervising.												
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week
	O	W	OT	I	G							
1		X		X		Assessment student assistant	2.1b, 2.1f	100%	5.5			

<b>CU76023</b>	<b>Title:</b> Labmanagement & Safety					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> -	<b>Mandatory:</b> Yes	<b>Language:</b> EN			
<b>Conditions for participation:</b> none												
<b>Special condition for credit allocation:</b> none												
<b>Course summary:</b>												
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week
	O	W	OT	I	G							
1		X		X		Assessment	2.1b, 2.1f	100%	5.5			

<b>CU24080</b>	<b>Title:</b> Professionalization block 7 & 8					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 10	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Attendance is mandatory. In case of ((un)foreseen, inevitable) absence, students have to contact their study coach.													
<b>Course summary:</b> Assignments, individual and as a group to work on personal professional skills and knowledge of the students competencies to develop toward a professional chemistry employee.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1	X	X		X		Individual reflection block 7 & 8	8.1a, 8.1b, 8.1d, 8.1e	100%	5.5	24	25	26	28

**Semester 5**

<b>CU13633V5</b>	<b>Title:</b> Professionalization year 3 (Prof 3, block 9 & 10))					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 23	<b>Mandatory:</b> Yes	<b>Language:</b> EN			
<b>Conditions for participation:</b> none												
<b>Special condition for credit allocation:</b> Attendance is mandatory. In case of ((un)foreseen, inevitable) absence, students have to contact their study coach.												
<b>Course summary:</b> This course comprises the following activities: <ul style="list-style-type: none"> <li>• Study progress</li> <li>• Orientation on profession</li> <li>• Personal development</li> <li>• Just in time workshops</li> <li>• Finding a suitable internship</li> <li>• Guest lectures</li> </ul>												
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week
	O	W	OT	I	G							
1	X	X		X		Portfolio assessment	8.2a, 8.2b, 8.2d, 8.2e	100%	5,5	N/A	N/A	N/A



<b>CU76012</b>	<b>Title:</b> HZ Personality, Free Composition Course 5					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 2	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU76012</b>	<b>Title:</b> HZ Personality, Free Composition Course 6					<b>Number of EC's:</b> 1.25	<b>Contact hours:</b> 2	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43

## 2.5 SPECIALISATION LIFE SCIENCES

## Semester 5 – Block 9 From Molecules &amp; Cells to Human Health

<b>CU76003</b>	<b>Title:</b> Immunology practice					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 42	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> Practicals, excursions and guest lectures: 100% attendance.													
<b>Course summary:</b> In this course you will study bacteria and viruses, and the mechanisms by which they cause disease. In addition, you will become acquainted with the complex reaction of our immune system to invading microorganisms.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X			X	Report on practical work	1.2g, 1.2h	60%	5.5	36 to 5	N/A	38 to 7	N/A
2	X			X		Practical work	1.2b, 1.2d, 1.2e, 1.2g, 1.2h, 2.2d, 2.2g, 2.2h, 2.2i, 8.1b, 1.2f, 8.1e, 7.1b, 7.1c	40%	5.5	36 to 5	N/A	38 to 7	N/A

CU76004		Title: Immunology 1 & Biochemistry 2					Number of EC's: 5		Contact hours: 28		Mandatory: Yes		Language: EN	
Conditions for participation: none														
Special condition for credit allocation: none														
<b>Course summary:</b> <b>Immunology 1.</b> In this course you will study bacteria and viruses, and the mechanisms by which they cause disease. In addition, you will become acquainted with the complex reaction of our immune system to invading microorganisms. <b>Biochemistry 2.</b> All life forms are similar at the molecular level. The processes by which they acquire and use energy, grow, replicate, and adapt follow similar basic rules. Biochemistry studies these processes, from metabolism of unicellular bacteria to cellular communication in mammals. In this course we will deal with the basic chemistry of life, the structure and function of proteins and how to study them. Furthermore this course addresses the energy metabolism of sugars, fats and amino acids, and how all these factors are related to the lifestyle and living environment of the organism.														
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week		
	O	W	OT	I	G									
1		X		X		Exam Immunology 1	1.2a, 1.2d, 2.2a, 2.2b	50%	5.5	42	43	44	46	
2		X		X		Exam Biochemistry 2	1.2a, 1.2b, 1.2c, 1.2d, 2.2a, 2.2c, 2.2d, 2.2b	50%	5.5	42	43	44	46	

<b>CU13415V6</b>	<b>Title:</b> Bioinformatics (BioInf)					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 15	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<p><b>Course summary:</b> Data is everywhere. Due to the enormous decrease in sequencing costs and the technical ease by which sequences can be determined, biomolecular research is becoming swamped by a deluge of data. You will need to make sense of it all, and this is where information technology comes into play. Besides storing and managing data – an achievement in itself – it is also necessary to share and compare the sequences to reveal ‘invisible’ patterns of similarities and differences, the biological relevance of sequence variants, and the evolution mechanisms underlying the enormous sequence variation that unites and distinguishes all life forms. Although bioinformatics itself is a scientific discipline that combines mathematics, information sciences, and biology, in this course we will primarily focus on the practical part, asking the following questions: ‘What can I actually learn from this sequence?’ and ‘How on earth should I begin?’</p>													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1	X	X		X		Assignments	1.2c, 1.2g, 2.2f	100%	5.5	49	51	2	4

**Semester 5 – Block 10 Achievements & Challenges of Life Sciences**

<b>CU76009</b>	<b>Title:</b> Molecular Biology Toolbox					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 56	<b>Mandatory:</b> Yes	<b>Language:</b> EN			
<b>Conditions for participation:</b> none												
<b>Special condition for credit allocation:</b> none												
<b>Course summary:</b> In this course you will develop more advanced skills in molecular biology research; starting with protocol development, up to executing experiments of your own mini project. The techniques that you will learn are e.g. recombinant DNA technology, genetic screening, purification and (activity) analysis of proteins, mammalian cell culturing, and transfection.												
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week
	O	W	OT	I	G							
1						Research report	1.2a, 1.2b, 1.2c, 1.2d, 1.2e, 1.2g, 1.2h, 2.2a, 2.2d, 2.2h, 2.2i, 2.2b, 1.2i	70%	5.5			
2	X	X		X		Oral presentation	1.2a, 1.2b, 1.2c, 1.2d, 1.2e, 1.2g, 1.2h, 2.2a, 2.2d, 2.2h, 2.2i, 2.2b, 1.2i	30%	5.5			

<b>CU76010</b>	<b>Title:</b> Immunology 2 & DNA 2					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b>													
<p><b>Immunology.</b> In this course you will study bacteria and viruses, and the mechanisms by which they cause disease. In addition, you will become acquainted with the complex reaction of our immune system to invading microorganisms.</p> <p><b>DNA2.</b> The completion of the Human Genome Project (HUGO), in which the entire human DNA sequence was determined, marked the beginning of a new era of scientific and technological development on the field of genetics. The speed of genetic sequencing techniques has increased, and the accompanying costs have plummeted. Sequencing the first human genome took 10 years and costed nearly \$3,000,000,000. Nowadays, over a decade after its completion, the same procedure takes roughly a week at a cost of \$10,000. The knowledge we have gained about human genetic diversity enables us to determine not only gender but also geographic origin, hair and eye colour of unidentified persons (CSI). Screening unborn children for genetic diseases (e.g. Down Syndrome) can now be performed by extracting foetal DNA from the blood of the mother instead of taking a sample of amniotic fluid, which entails the risk of inducing abortion. We can use a genetic profile to determine whether someone is at risk of developing certain forms of cancer (e.g. breast cancer). Besides human genetics, genomic screens are now common practice in breeding new variants of plants that are resistant against drought or pests. Genetic engineering has produced cotton plants that produce their own insecticides, and it enables us to produce human insulin in bioreactors to provide therapeutics for the treatment of diabetic patients. Genetics is everywhere in our society, and in this course we will study its principles, techniques, and application from basic single gene cloning to genome wide screening, and whole genome sequencing.</p>													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Exam Immunology 2	1.2a, 1.2d, 2.2a, 2.2b	40%	5.5	2	3	4	6
2	X			X		Presentation	6.1d, 6.1e	10%	5.5	5	N/A	9	N/A
3		X		X		Exam DNA2	1.2a, 1.2b, 1.2c, 1.2d, 2.2a, 2.2c, 2.2d, 2.2b	50%	5.5	2	3	4	6

<b>CU13416V6</b>	<b>Title:</b> Biotechnology (BioTech)					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 14	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> Subjects from the previous life science courses will be reinterpreted in the context of the diverse and multidisciplinary biotechnological workforce that the students will become part of. Biotechnology draws knowledge and expertise from many basic sciences and combines that knowledge in a wide array of applications.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			X	X		Active participation, including preparation and written reflection	1.2c, 1.2g, 8.2c	100%	5.5	3	5	7	9



## 2.6 SPECIALISATION APPLIED CHEMISTRY

## Semester 5 – Block 9 Specialisation Applied Chemistry I

<b>CU76000</b>	<b>Title:</b> Chromatography practice					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 64	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> 100% attendance at practicals, excursions and guest lectures. Note the formative exam from course <b>CU76001</b> is related to the mark of Attitude during lab lessons													
<b>Course summary:</b> This practical is an advanced application of the theory obtained in Blok 7 and 8 (Separations). You will design and perform your own experimental approach starting from published scientific literature. Method development is a relevant part of this class as well as your own preparation and understanding of the topics. You will get hands-on experience with techniques such: HPLC-UV, GC-FID, Headspace-GC-FID, GC-MS. Sample preparation is an important part of the class as well as the reporting of the data and co-operation within your practical-team.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Report on practical work	1.1h, 1.1c, 1.1.d	25%	5.5	36 to 5	N/A	38 to 7	N/A
2		X			X	Report on troubleshooting	2.2c, 1.1f	40%	5.5	36 to 5	N/A	36 to 5	N/A
3	X	X		X		Individual workplace assessment	1.1f, 2.2h, 8.1d	35%	5,5	36 to 5	N/A	38 to 7	

<b>CU76001</b>	<b>Title:</b> Polymer chemistry & analysis					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 28	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Conditions for credit allocation:</b> none													
<b>Course summary:</b> This course provides an introduction to the chemical structure of the most common polymers, formation mechanisms and their physical properties. In addition, you will also discuss polymer processing techniques and analytical techniques. Special attention is dedicated to analysis by means of Size Exclusion Chromatography. Separations techniques and especially troubleshooting are highlighted. Part of the course is an on-site practical in a company.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Open question exam	2.1f, 2.2a, 2.2 b	100%	5.5	42	43	44	46
2	X				X	Method development and lab preparation	1.1c, 1.1 d, 8.1.d, 1.2. h	0%	5.5	36 to ???			

<b>CU76002</b>	<b>Title:</b> Circular Chemistry					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 14	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> complete the formative assignment and formative literature review assignment of this course													
<b>Course summary:</b> The solution to rising fossil fuels prices, depletion of raw materials and the reduction of greenhouse gases is the development of green chemicals and sustainable production processes. This course is an introduction to the biobased economy, biobased products and biobased chemical techniques. With regards to the importance of the transition of an economy based on oil to a circular and biobased economy awareness will be created. Together we will discuss the consequences of making choices and the ethical behavior of the student. All knowledge acquired in previous Chemistry courses will be useful during this course. The principles of Green Chemistry will be discussed. Guest speakers will provide the link with practice. Because the subject of Biobased Chemistry is in development, you will frequently use peer reviewed literature. You will study in a specific topic of biobased chemistry (e.g. biodiesel, packing material, biopolymers, biobased colors, etc.). You will compare fossil fuel products with products that are produced in a biobased way and you are able to name the pros and cons. You will study companies that produce biobased products. By means of literature research, you increase your knowledge about the topic you have chosen. For completion you will write a literature review on your biobased chemistry topic with the aim that your fellow students can use this review as reference work. In addition, you share the knowledge gained with your fellow students by giving a presentation. After this presentation, your findings will be discussed with both teacher and fellow students. In a practical assignment you will apply your acquired knowledge and deepen it further. You will investigate regional biomass (such as marine algae) as potential renewable resource. The research will be done in collaboration with the research group 'Marine Biobased Specialties'. In a student group you will independently develop a protocol to extract and quantify an interesting chemical component from marine biomass. You will be supervised by the teacher and get his/her help in making a plan of approach. This practical part is also a good preparation for the upcoming minor, internship and final graduation.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		x		x		Open question exam	8.1c, 8.2c	100%	5.5	42	43	44	46

**Semester 5 – Block 10 Specialisation Applied Chemistry II**

<b>CU76006</b>	<b>Title:</b> Circular Chemistry practice					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 64	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> complete the formative assignment and formative literature review assignment of this course													
<b>Course summary:</b> The solution to rising fossil fuels prices, depletion of raw materials and the reduction of greenhouse gases is the development of green chemicals and sustainable production processes. This course is an introduction to the biobased economy, biobased products and biobased chemical techniques. With regards to the importance of the transition of an economy based on oil to a circular and biobased economy awareness will be created. Together we will discuss the consequences of making choices and the ethical behavior of the student. All knowledge acquired in previous Chemistry courses will be useful during this course. The principles of Green Chemistry will be discussed. Guest speakers will provide the link with practice. Because the subject of Biobased Chemistry is in development, you will frequently use peer reviewed literature. You will study in a specific topic of biobased chemistry (e.g. biodiesel, packing material, biopolymers, biobased colors, etc.). You will compare fossil fuel products with products that are produced in a biobased way and you are able to name the pros and cons. You will study companies that produce biobased products. By means of literature research, you increase your knowledge about the topic you have chosen. For completion you will write a literature review on your biobased chemistry topic with the aim that your fellow students can use this review as reference work. In addition, you share the knowledge gained with your fellow students by giving a presentation. After this presentation, your findings will be discussed with both teacher and fellow students. In a practical assignment you will apply your acquired knowledge and deepen it further. You will investigate regional biomass (such as marine algae) as potential renewable resource. The research will be done in collaboration with the research group 'Marine Biobased Specialties'. In a student group you will independently develop a protocol to extract and quantify an interesting chemical component from marine biomass. You will be supervised by the teacher and get his/her help in making a plan of approach. This practical part is also a good preparation for the upcoming minor, internship and final graduation.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		x			x	Report on practical work	1.2c, 1.2d, 1.2e, 2.2c, 2.2d, 2.2e, 2.2i, 1.2i, 6.1d	100%	5.5	36 to 5	N/A	38 to 7	N/A

<b>CU76007</b>	<b>Title:</b> Advanced Chromatography					<b>Number of EC's:</b> 5	<b>Contact hours:</b> 14	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> 100% attendance at practicals, excursions and guest lectures													
<b>Course summary:</b> This course is a follow-up of the separation part of block 7,8 and 9. The focus is solving troubleshooting casus from practical situations, adding new knowledge of advanced level such new developments in chromatography and two-dimensional chromatography (GCxGC and LCxLC) in combination to lab visits and guest lectures to international companies such Dow Benelux, Sabic and Restec.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Open question exam	2.1f, 2.2f, 1.1c, 2.2b	70 %	5.5	2	3	4	6
2			X		X	Casus Presentation	2.2b, 1.1 h	30%	5.5	During block 10	N/A	38 to 7	

<b>CU76008</b>	<b>Title:</b> Circular chemistry & Biopolymers					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 20	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Conditions for credit allocation:</b> none													
<b>Course summary:</b>													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Literature review	2.2f, 1.1c, 2.2b	60%	5.5	2	3	4	6
2	X			X		Presentation literature review	2.2.f, 1,1,c, 2.2b	40%	5.5.	2	3	4	6

Semester 6													
CU76012	Title: HZ Personality, Free Composition Course 7					Number of EC's: 1.25	Contact hours: 2	Mandatory: Yes	Language: NL/EN				
Conditions for participation: none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43

<b>CU05600V12</b>	<b>Title:</b> Research minor (MINOR)					<b>Number of EC's:</b> 30	<b>Contact hours:</b>	<b>Mandatory:</b> Yes	<b>Language:</b> EN/NL				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> none													
<b>Course summary:</b> In the Chemistry research minor, you will learn in the familiar environment of the HZ how to conduct assignment-led research. The assignment may have been provided by an internal research group such as OG Aquaculture or an external party such as Philips or Applied Instruments. You are responsible for the complete assignment. This includes defining research questions, performing in-depth research, presenting and discussing results, and writing a report.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1		X		X		Report and poster presentation	1.2a, 1.2b, 1.2c, 1.2d, 1.2e, 1.2f, 1.2g, 1.2h, 1.2i, 2.2a, 2.2b, 2.2c, 2.2d, 2.2f, 2.2g, 2.2h, 2.2i 5.1a, 5.1b, 5.1e	60%	5.5	23	25	27	28
2	X			X		Portfolio	5.1a, 5.1b, 5.1e, 8.1a, 8.1b, 8.1e	40%	5.5	23	25	27	28

Semester 7													
CU76012	Title: HZ Personality, Free Composition Course 8					Number of EC's: 1.25	Contact hours: 2	Mandatory: Yes	Language: NL/EN				
Conditions for participation: none													
<b>Special condition for credit allocation:</b> There is a maximum of 2.5 EC to be done within one single category. At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well. For each activity, an accompanying Personal Development Plan is mandatory. Further information as described at the HZ.learn page of Chemistry.													
<b>Course summary:</b> The educational programme of a study programme contains a free composition space of minimally 2.5 academic credits in each academic year. The student is allowed to earn FCC credits with extracurricular activities such as: management activities, informational and promotional activities, cultural activities, instructional activities, project activities or training activities. The student will submit proposals for the free composition space to the SCC or FCC assessor prior to the activity. Afterwards, the SCC or FCC assessor will assess if the activity was performed in a satisfactory manner. Further details regarding the content and related criteria can be found in last version of the Student Manual HZ Personality, HZ University of Applied Sciences.													
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week	
	O	W	OT	I	G								
1			x	X		Assessment on portfolio of personal activities	6 a-e, 7 a-h, 8 a-e	100%	5.5	35 to 41	35 to 41	36 to 42	43



<b>CU06725V17</b>	<b>Title:</b> Internship in company					<b>Number of EC's:</b> 27.5	<b>Contact hours:</b> 16	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN			
<b>Conditions for participation:</b> See article 2.28												
<b>Special condition for credit allocation:</b> none												
<b>Course summary:</b> Carry out one or more assignments that help you acquire the competences (learning objectives) recorded in the internship plan.												
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week
	O	W	OT	I	G							
1	X	X		X		Final Evaluation (portfolio with evidence)	40%	5.5	N/A	N/A	N/A	N/A
2		X		X		Internship report	60%	5.5	N/A	N/A	N/A	N/A

**Semester 8**

<b>CU06726V15</b>	<b>Title:</b> Final Thesis & project					<b>Number of EC's:</b> 30	<b>Contact hours:</b>	<b>Mandatory:</b> Yes	<b>Language:</b> NL/EN			
<b>Conditions for participation:</b> See 2.2.11												
<b>Special condition for credit allocation:</b> none												
<b>Course summary:</b> Conduct research: complex, practical assignment in complex situation, independent research, select from relevant methods.												
Exam no.	Form					Contents	Weighting factor	Lowest passing grade	Planning exam week	Exam review	Planning resit in week	Review resit in week
	O	W	OT	I	G							
1	X	X		X		Final assessment of performance and professional competencies	40%	5.5	N/A	N/A	N/A	N/A
2	X	X		X		Final assessment of research competency required by the HZ	60%	5.5	N/A	N/A	N/A	N/A

### 3 Additional information on Chemistry program

#### 3.1 HZ Personality & free composition courses (see article 3.12 CER HZ)

Additional on the article 3.12 CER HZ:

Students can choose activities of the following categories:

Category:	Course code:
1 Management activities	(VCCU76011)
2 Information & promotion activities	(VCCU76012)
3 FCC (regular activities like HZ Cult, HZ, Sport)	(VCCU76013)
4 Coaching activities	(VCCU76014)
5 Project activities	(VCCU76015)
6 Training activities and courses	(VCCU76016)

Additional restrictions:

There is a maximum of 2.5 EC to be done within one single category.

At least 1.25 EC should be done for category 2 and at least 1.25 EC for category 4 as well.

For each activity, an accompanying Personal Development Plan is mandatory, as described at the HZ.learn page of Chemistry and with support of the Study Coach.

#### 3.2 Specialisations (article 3.10 CER HZ)

The Chemistry programme offers the following majors:

- Applied Chemistry
- Life Sciences

Students choose one of these majors by delivering a motivational letter. For additional information see programme descriptions. These can be found on the Chemistry website and are available from the Academy Office.

#### 3.3 Work placement (article 3.9 CER HZ)

No additional requirements for advancement have been formulated for the work placement. For information on the graduation/graduation internship, securing an internship and its assessment, please refer to 'Graduation' in the general student manual and in the programme-specific student manual. These can be found on the Chemistry website and are available from the Academy Office.

#### 3.4 Minor (article 3.8 CER HZ)

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

#### 3.5 Participation international exchange programme (article 4.5 CER HZ)

The programme does not have an international exchange programme.

**3.6 Graduating (article 3.9. EER)**

- 3.6.1 In order to participate in the graduation phase of the Chemistry programme (semester 8), the student has to have no more than 10 ECTS unpassed, besides the 30 ECTS of the graduation phase. The actual graduation manual is applicable for each student, starting a graduation.

For information on the graduation/graduation internship, securing an internship and its assessment, please refer to 'Graduation' in the general student manual and in the programme-specific student manual. These can be found on the Chemistry website and are available from the Academy Office.

**3.7 Transitional arrangement (article 6.2 CER HZ)**

The Chemistry program 2018-2019 contains a transitional arrangement for students of the cohort 2016-2017 (or earlier). The Chemistry program offers the students of the 2016-2017 cohort a one year period (2019-2020) for resits of courses of the 3<sup>rd</sup> year. Examinations will be in accordance with the old program.

**4 Establishment and duration****4.1 Duration**

The duration of the Implementation Regulations equals the duration of the Education and Examination Regulations HZ 2019-2020.

**4.2 Establishment**

These Implementation Regulations are established by the Executive Board on 10/09/2019.