

# 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 Academy director

- 1.3.1 The appointed academy 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**

**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 for exemptions for 2<sup>nd</sup> year courses, except the courses ORGII CU03956 (S3) and SPEC CU03955 (S4).

**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.

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.

**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.

## 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:	01-01-2012
Final date accreditation:	31-12-2017
Associate degree:	-
Combined study programma:	-
Accelerated course higher professional education (pre-university)	Yes



## 2.2.3.1 Programme regular track 240 EC

Semester	CourseID	EC	Title	Abbreviation
S8	CU06726	30	Final Thesis & project	FinThesis
S7	CU06725	30	Internship in company	Internship
S6	CU05600	30	Research minor	MINOR
S5 - LS	CU04990	7.5	Infection & Immunity	IMM
	CU04991	5	Molecular genetics and genomics	DNA 2
	CU05004	5	Biochemistry & Cell physiology	BCP
	CU13415	2.5	Bioinformatics	BioInf
	CU13416	2.5	Biotechnology	BioTech
S5 - AC	CU04986	7.5	Advanced chromatography	CHR
	CU04987	7.5	Polymer chemistry	POL
	CU15623	7.5	Biobased Chemistry	BioB
S5	CU13633	2.5	Professionalization year 3	Prof 3
	CU12630	2.5	Free composition course semester 5	FCC S5
	CU19586	2.5	Extended statistics 1 for Chemistry	Ext Stat 1
S4	CU03953	7.5	Separation techniques	SEP
	CU03954	7.5	Challenges of DNA	DNA 1
	CU03955	7.5	Advanced spectroscopy	SPE
	CU08743	2.5	Chemistry & Safety	C&S
	CU13631	2.5	Professionalization year 2	Prof 2
	VCCU19590	1.25	Free composition course semester 4	FCC S4
S3	CU03835	7.5	Biochemical toolbox	BCT
	CU03946	7.5	Water	WAT
	CU03956	7.5	Organic 2	ORG 2
	CU04205	2.5	English for Chemistry 2	ESP BAS 2
	CU05612	2.5	Data analysis	DATA
	CU08049	2.5	Instructing, supervising, teaching	IBD
	VCCU19589	1.25	Free composition course semester 3	FCC S3
	S2.2	CU20632	5	Chemistry & Health
CU20633		5	Basics of Organic Chemistry 2 & Biochemistry 2	Org2Bio2
CU20634		3.75	Math 3 & Statistics 2	Math3Stat2
CU20638		1.25	Professionalization quarter 3 & 4	Prof q3 & q4
S2.1	VCCU19588	1.25	Free composition course semester 2	FCC S2
	CU20629	5	Oil- and Biorefinery	Refinery
	CU20630	5	Basics of Organic Chemistry 1 & Biochemistry 1	Org1Bio1
	CU20631	3.75	Biobased products & economy	BioBpr
S1.2	CU20626	5	Pool chemistry	PoolChe
	CU20627	5	Basics of Chemistry 2 and Microbiology 2	Che2Mic2
	CU20628	3.75	Physics 2, Math 2 & Statistics 1	Phy2Mat2Stat1
	CU20637	1.25	Professionalization quarter 1 & 2	Prof q1 & q2
S1.1	VCCU19587	1.25	Free composition course semester 1	FCC S1
	CU20623	5	Food Chemistry	FoodChe
	CU20624	5	Basics of Chemistry 1 and Microbiology 1	Che1Mic1
	CU20625	3.75	Physics 1 & Mathematics 1	Phy1Mat1

### 2.2.3.2 Programme regular track 180 EC

See 2.2.3.1. The program of the regular track consists of 240 EC. If the student follows the short track of 180 EC, semester 3 and 4 is the propedeutic level.

### 2.2.3.3 Language

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.

### 2.2.3.4 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.

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 take place during the 5-day practical resit period (PRP). For the academic year 2017-2018, the PRP is scheduled in calendar weeks 25.
- 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 practical resit period (PRP).
  - 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 PRP or do an alternative practical assignment.

It is not possible to resit laboratory activities as 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.

### 2.2.3.5 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.

2.2.3.6 Supplement validity test results (article 6.7.1, CER HZ)

This limitation of the validity period is not applicable on results achieved for practical's work.

## 2.2.4 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 – kwartaal 1**

<b>CU20623</b>	<b>Title:</b> Food 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> Practicals with topics from basics of Chemistry 1 and Microbiology. In this practical students will also brew beer and measure several chemical characteristics of their own brewed beer.													
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>CU20624</b>		<b>Title:</b> Basics of 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> Student will the most important basics of Chemistry and Microbiology. The theory is related to the practical experiment of Food Chemistry.													
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>CU20625</b>	<b>Title:</b> Physics 1 & Mathematics 1					<b>Number of EC's:</b> 3.75	<b>Contact hours:</b> 42	<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> Math. Assessing manipulations with quantitative data. Being able to handle and process formulas. Graphical representation of quantitative items. Interpretation of graphical and mathematical data  Physics. Topic light													
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	50%	5.5	42	43	44	46
2		X		X		Individual written exam Physics 1	2.1b, 2.1f	50%	5.5	42	43	44	46

**Semester 1 – kwartaal 2**

<b>CU20626</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> Experiments focus on several different compounds in water from swimming pools. Student will learn to organize sampling and measuring of water from swimming pools to learn about chemical composition													
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>CU20627</b>		<b>Title:</b> Basics of 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> This course is second part of Chemistry 1 and Microbiology 1. Focus of this course is some more indepth knowledge of the basics of Chemistry and Bioblogy. The topcis of this course are related to the theme of this quarter, i.e. Pool Chemistry.													
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>CU20628</b>	<b>Title:</b> Physics 2, Math 2 & Statistics 1					<b>Number of EC's:</b> 3.75	<b>Contact hours:</b> 42	<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> Physics. Topic  Math. Logarithm.  Statistics. Descriptive statistics, probability theory, normal distribution, reliability of estimates, how to display research findings (rounding estimates), error calculations. Creating graphs such as histograms, bar charts, pie charts etc.													
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 2	2.1b, 2.1f	33%	5.5	2	3	4	6
2		X		X		Individual written exam Physics 2	2.1b, 2.1f	33%	5.5	2	3	4	6
3		X		X		Individual written exam Statistics 1	2.1f	34%	5.5	2	3	4	6

<b>CU20637</b>	<b>Title:</b> Professionalization quarter 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> none													
<b>Course summary:</b> This course focusses on students professional behaviour. The chemical skills and also some soft skills are topic of this course. Students learn how to work in a team while working in learning teams and doing peer reviews .													
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 quarter 1 & 2	8.1a, 8.1b, 8.1d, 8.1e	100%	5.5	2	3	4	6

## Semester 2 – kwartaal 3

<b>CU20629</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 (3 times; average mark)	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>CU20630</b>	<b>Title:</b> Basics of Organic Chemistry 1 & Biochemistry 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, synthesis. A short overview on alkanes, alkenes, alkynes will be given as well as typical reactions such: electrophilic-, substitution- and elimination reactions. Special attention will be held on Fischer esterification and the concept of completion of reactions.</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 Biochemistry 1	2.1a, 2.1b, 2.1f	50%	5.5	13	14	15	17

<b>CU20631</b>	<b>Title:</b> Biobased products & economy					<b>Number of EC's:</b> 3.75	<b>Contact hours:</b> 42	<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	Literature research	2.1h, 1.1c	40%	5.5	5 to 12	6 to 13	7 to 14	16
2		X			X	Practical evaluation (ethics and statistics)	8.1c, 1.1g	60%	5.5	5 to 12	6 to 13	7 to 14	16

**Semester 1 – kwartaal 4**

<b>CU20632</b>	<b>Title:</b> Chemistry & Health					<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> This course has a focus on health from Chemical en Biological perspective. Students will get more indepts knowledge of Chemical and Microbiological processes and how to measure several chemical and biological parameters.													
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>CU20633</b>	<b>Title:</b> Basics of Organic Chemistry 2 & Biochemistry 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> Students will get more in depth knowledge of organic and biochemical chemistry, like reactions, structure and behaviour of organic compounds.													
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 Biochemistry 2	2.1a, 2.1b, 2.1d, 2.1f	50%	5.5	24	25	26	28

<b>CU20634</b>		<b>Title:</b> Math 3 & Statistics 2					<b>Number of EC's:</b> 3.75	<b>Contact hours:</b> 42	<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> Chemical calculation and working out statistical problems is an important skill for chemistry students. In this course they will learn about important mathematical and statistical tools which are needed to run experiments and work out results mathematical and statistical.													
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 3	2.1b, 2.1f	66%	5.5	24	25	26	28
2		X		X		Individual written exam Statistics 2	2.1b, 2.1f	34%	5.5	24	25	26	28

<b>CU20638</b>		<b>Title:</b> Professionalization quarter 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> none													
<b>Course summary:</b> This course is follow up of Professionalisation 1 and 2. This course focusses on students professional behaviour. The chemical skills and also some soft skills are topic of this course. Students learn how to work in a team while working in learning teams and doing peer reviews .													
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 quarter 3 & 4	8.1a, 8.1b, 8.1d, 8.1e	100%	5.5	24	25	26	28



- 2.2.4a Additional information on study programmes that are involved in conversion in the sector technology  
No additional information.

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

Semester 3													
CU03835	Title: Biochemical Toolbox (BCT)					Number of EC's: 7.5	Contact hours: 57	Mandatory: Yes	Language: EN				
Conditions for participation: none													
Special condition for credit allocation: None													
<p><b>Course summary:</b> Biochemists want to understand in molecular detail the function of cellular reactions occurring in vitro (under controlled conditions) AND to relate this information to what occurs in reality inside a living cell ( in vivo ). They need to know the concentrations and properties of the macromolecules inside cells in order to understand the `jungle` of metabolism. The toolbox gives theoretical and practical information about three important groups of molecules in the cell, the carbohydrates, lipids and proteins. Their structures, properties, importance in celmetabolism and applications in industry, biobased economy and medicine will be discussed. During practical techniques like centrifugation, extraction, thin layer chromatography, sodium dodecyl sulphate poly acryl gel electrophoreses and spectroscopic detection of enzyme activity will be executed.</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		Open question exam	2.1a, 2.1b, 1.2a, 1.2c	35%	5.5	2	3	4	6
2		X		X		Essay	1.2c, 2.2f, 1.3e, 1.3g, 1.3h, 1.3i, 2.1i, 2.2g, 2.2h	15%	5.5	2	5	7	9
3		X			X	Report on practical work	1.2g, 2.2f, 1.1h, 1.1i, 2.1i, 2.2g, 2.2h	35%	5.5	36 to 5	N/A	38 to 7	N/A
4			X	X		Workplace assessment	1.2e, 2.1i, 2.2c, 2.2d, 2.2e	15%	5.5	36 to 5	N/A	36 to 5	N/A

<b>CU03946</b>	<b>Title:</b> Water (WAT)					<b>Number of EC's:</b> 7.5	<b>Contact hours:</b> 57	<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 the course you will become acquainted with the fundamental sides of analytical chemistry. The knowledge you acquire will enable you to match theory, reality and instrumental data.													
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	2.1a, 2.2f, 2.1i, 2.2d	50%	5.5	2	3	4	6
3		X			X	Report on practical work	2.1c, 2.1d, 2.1f, 2.2d	35%	5.5	36 to 5	N/A	38 to 7	N/A
4			X	X		Workplace assessment	2.1b, 2.1c, 2.1d, 2.1e, 2.1f, 2.1g	15%	5.5	36 to 5	N/A	36 to 5	N/A

<b>CU3956</b>	<b>Title:</b> : Organic 2 (ORG 2)					<b>Number of EC's:</b> 7.5	<b>Contact hours:</b> 57	<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 theory expands and deepens your knowledge of the properties and reactions of common organic substances, for example, molecules containing a carbonyl group, (non-) substituted aromatic carbons, carbohydrates, polysaccharides and polymers. During the practicals you work as a team on the multi-step synthesis and characterisation of a prescribed substance and a molecule of your own choice. In the practicals you focus on planning, theoretical aspects of the reactions, safety and reporting.													
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	2.2f, 2.2a, 2.2b	50%	5.5	2	3	4	6
2	X	X		X	X	Oral & written Reports	1.2a, 1.2b, 1.2c, 1.2d, 1.2e, 1.2g, 1.2h, 2.2d, 2.2g, 2.2h, 2.2b, 1.2f, 2.2i	30%	5.5	40/44/46	42/46/48	3	5
3	X	X		X		Assessment	8.1b, 8.1e, 8.1a	20%	5.5	5	N/A	7	N/A

<b>CU08049</b>	<b>Title:</b> Instructing, supervising, teaching (IBD)					<b>Number of EC's:</b> 2.5	<b>Contact hours:</b> 2	<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		X		Portfolio assessment	6.1a, 6.1b, 6.1c	100%	5.5	N/A	N/A	N/A

<b>CU05612</b>	<b>Title:</b> Data analysis (DATA)					<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> none												
<b>Course summary:</b> One of the essential tools in your toolbox is the ability to work with a spreadsheet programme. Spreadsheet programmes are used in all businesses and institutions to analyse data from measurements or to design a simulation model.												
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		Produce a design	2.2f	50%	5.5	44	46	48
2		X		X		Produce a design	2.2f	50%	5.5	3	5	7

<b>CU04205</b>	<b>Title:</b> English for Special Purposes ESP2 (BAS ESP2)					<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> none													
<b>Course summary:</b> In this course you will learn how to communicate in English to a B2 level with the following skills: Reading, Writing and Speaking.													
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 questions – reading, vocabulary, grammar	1.1h	40%	5.5	2	3	4	6
2		X		X		Oral – Presentation/Formal meetings	1.1h	40%	5.5	4/5	n/a	15/16	n/a
3		X		X		Report	1.1h	20%	5.5	N/A	N/A	N/A	N/A

Semester 4													
CU03954	Title: Challenges of DNA (DNA 1)					Number of EC's: 7.5	Contact hours: 57	Mandatory: Yes	Language: EN				
Conditions for participation: none													
Special condition for credit allocation: none													
<b>Course summary:</b> The unraveling of the DNA-base sequence of the human genome was a peak in the history of Life Sciences. After all, DNA is the blueprint of life: it gives a code via mRNA for functional proteins in a cell. This knowledge is based on extensive laboratory research. Even the creation of 'new life' is possible now; but we will not go that far in this course. In this course you will isolate, analyze and 'manipulate' DNA yourself. Working safely with genetically modified bacteria (GMOs) in compliance with up-to-date legislation is also included in this course, together with the underlying theoretical concepts of molecular biotechnology and ethical aspects.													
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 part 1	1.2a, 1.2c, 2.2a, 2.2b	20%	5,5	13	14	15	17
2		X		X		Exam part 2	1.2a, 1.2c, 2.2a, 2.2b	30%	5,5	24	25	26	28
3		X			X	Report practical work	1.2g, 1.2h, 2.2f, 1.1i, 1.1c, 2.1h, 2.2g	35%	5,5	6 to 24	N/A	8 to 26	N/A
4			X	X		Workplace assessment	1.1d, 1.1e, 2.2c, 2.2d, 2.2e, 2.2i	15%	5,5	6 to 24	N/A	8 to 28	N/A

<b>CU03953</b>	<b>Title:</b> Separation techniques (SEP)					<b>Number of EC's:</b> 7.5	<b>Contact hours:</b> 57	<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> To check the quality of a product, you must develop techniques to analyze a product in its components. You are going to learn how can you create such an analysis method and which are the steps, and parameters to improve such technique.													
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	2.2c, 2.2b, 2.3h	50%	5,5	24	25	26	28
2		X			X	Report	1.2c, 1.2e, 1.2g, 1.2h, 1.2f	30%	5,5	25	N/A	27	N/A
3	X		X	X		Assessment	2.2a, 2.2d, 2.2e, 2.2g, 2.2h, 2.2b, 8.2b, 8.2e	20%	5,5	25	27	35	36

<b>CU03955</b>	<b>Title:</b> Advanced Spectroscopy (SPE)					<b>Number of EC's:</b> 7.5	<b>Contact hours:</b> 57	<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 consists of two spectrophotometric methods: molecular absorption (UV-Visible) and emission (fluorescence) spectrophotometry; and atomic absorption (flame AAS and graphite furnace AAS) and emission (flame photometry). You test the theory in the practicals first by working with samples without a matrix (clean samples) in order to become sufficiently familiar with the instrument. The samples then become more complex in nature, and the emphasis comes to lie on sample pre-treatment, matrix removal and reproducibility of the chosen spectrophotometric method.													
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	2.3b, 2.3f	30%	5.5	13	14	15	17
2		X		X		Open question exam	2.1f	20%	5.5	24	25	26	28
3	X	X		X		Poster and data presentation	1.2g, 1.2h	35%	5.5	13	N/A	15	N/A
4	X		X	X		Laboratory Assessment	2.2f, 2.2b, 2.2g, 2.2c, 2.2h, 2.2d	15%	5.5	N/A	N/A	N/A	N/A

<b>CU08743</b>	<b>Title:</b> Chemistry & Safety (C&S)					<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> 80% attendance.													
<b>Course summary:</b> The course is an introduction to general safety and safety topics related to chemicals and the production, processing, transport and storage of chemicals, including the legal aspects and a person's own responsibility.													
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 in classes	1.2f	35%	5.5	22	N/A	N/A	N/A
2	X				X	Presentation	1.2h	35%	5.5	22	N/A	25	N/A
3		X		X		Portfolio	4.1a, 4.1b, 4.1c, 4.1e	30%	5.5	22	N/A	25	N/A



<b>CU13631</b>	<b>Title:</b> Professionalization year 2 (Prof 2)					<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> none												
<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> </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	8.1a, 8.1b, 8.1d	100%	5,5	N/A	N/A	N/A

Semester 5												
<b>CU13633</b>	<b>Title:</b> Professionalization year 3 (Prof 3)					<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> none												
<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> </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	100%	5,5	N/A	N/A	N/A	N/A

<b>CU19586</b>	<b>Title:</b> : Extended Statistics 1 for Chemistry (Ext stat 1)					<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> none												
<b>Course summary:</b> As a follow-up to the course in basic statistics, this is the next step in understanding and applying statistical techniques. We also investigate the statistical capability of the Excel package.												
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 questions, Individual test in computer room	100%	5.5	2	3	4	6

**SPECIALISATION LIFE SCIENCES**

CU04990	Title: Infection & Immunity (IMM)					Number of EC's: 7.5	Contact hours: 57	Mandatory: Yes	Language: EN			
Conditions for participation: none												
Special condition for credit allocation: Practicals, excursions and guest lectures: 100% attendance.												
Course summary: 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		Exam part 1	20	5.5	42	43	44	46
2		X		X		Exam part 2	20	5.5	2	3	4	6
3	X			X		Presentation	10	5.5	5	N/A	9	N/A
4		X			X	Report on practical work	30	5.5	36 to 5	N/A	38 to 7	N/A
5	X			X		Practical work	20	5.5	36 to 5	N/A	38 to 7	N/A

<b>CU05004</b>	<b>Title:</b> Biochemistry & cell physiology (BCP)					<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> none													
<b>Course summary:</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. We will also investigate the relation between cell cycle control and cancer, which is the second major cause of death in the Western world.													
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	1.2a, 1.2d, 2.2a, 2.2b	40%	5.5	2	3	4	6
2	X	X		X		Research report, case studies, and reflection	1.2a, 1.2b, 1.2c, 1.2d, 1.2e, 1.2g, 1.2h, 2.2a, 2.2c, 2.2d, 2.2h, 2.2i, 2.2b, 1.2i, 8.1e	40%	5.5	5	7	9	11
3		X			X	Poster presentation of practical work	1.2a, 1.2b, 1.2c, 1.2g, 1.2h, 2.2h, 1.2i	20%	5.5	5	7	9	11

CU04991	Title: Molecular genetics & genomics (DNA 2)					Number of EC's: 5	Contact hours: 42	Mandatory: Yes	Language: EN				
Conditions for participation: none													
Special condition for credit allocation: none													
<p><b>Course summary:</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		Open question exam	1.2a, 1.2d, 2.2a, 2.2b	40%	5.5	42	43	44	46
2	X	X		X		Research report, case studies, and reflection	1.2a, 1.2b, 1.2c, 1.2d, 1.2e, 1.2g, 1.2h, 2.2a, 2.2c, 2.2d, 2.2h, 2.2i, 2.2b, 1.2i, 8.1e	40%	5.5	51	3	5	7
3	X				X	Presentation	1.2a, 1.2b, 1.2c, 1.2g, 1.2h, 2.2h, 1.2i	20%	5.5	50	2	4	6

<b>CU13415</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 and reflection	1.2c, 1.2g, 1.2h, 2.2c, 8.1e	50%	5.5	51	2	4	6
2	X			X		Oral presentation	1.2c, 1.2g, 1.2h, 2.2c	50%	5.5	51	2	4	6

<b>CU13416</b>	<b>Title:</b> Biotechnology (BioTech)					<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												
<b>Course summary:</b> This course is the culmination of various molecular biology courses. All subjects from the previous 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 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, 1.2h, 8.1c	50%	5.5	N/A	N/A	N/A
2			X	X		Final essay	1.2c, 1.2g, 1.2h, 8.1c	50%	5.5	5	7	9

### SPECIALISATION APPLIED CHEMISTRY

<b>CU04987</b>	<b>Title:</b> Polymer chemistry (POL)					<b>Number of EC's:</b> 7.5	<b>Contact hours:</b> 48	<b>Mandatory:</b> Yes	<b>Language:</b> EN			
<b>Conditions for credit allocation:</b> Active participation on-site practical in-company												
<b>Course summary:</b> This course provides an introduction to the chemical structure of the most common polymers, formation mechanisms and their properties. In addition, you will also discuss polymer processing such as extrusion, (blow) moulding and spinning, and the re-use of polymers. 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	2.2f, 1.1c, 2.2b	100%	5.5	2	3	4

<b>CU04986</b>	<b>Title:</b> Advanced Chromatography (CHR)					<b>Number of EC's:</b> 7.5	<b>Contact hours:</b> 53	<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> After the separation technics course, in which you learnt the basic principles of separation techniques – fluid-fluid and solid-fluid extraction, gas chromatography and fluid chromatography – you will now focus your attention on sample pre-treatment and quantitative analysis. In the practicals you will test the theory of different injection techniques and derivatisation methods in gas chromatography.													
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	50%	5.5	2	3	4	6
2		X			X	Report on practical work	1.2c, 1.1c, 1.1e, 2.2g, 1.2f	25%	5.5	36 to 5	N/A	38 to 7	N/A
3		X			X	Report on troubleshooting	2.2c, 1.1f	25%	5.5	36 to 5	N/A	36 to 5	N/A

<b>CU15623</b>	<b>Title:</b> Biobased (BioB)					<b>Number of EC's:</b> 7.5	<b>Contact hours:</b> 57	<b>Mandatory:</b> Yes	<b>Language:</b> EN				
<b>Conditions for participation:</b> none													
<b>Special condition for credit allocation:</b> finishing introducing assignment													
<b>Course summary:</b> Introduction on the biobased economy, biobased products and biobased chemical techniques. Creating awareness of the importance of changing from oilbased economy to a circular and biobased economy. Learning about the role of ethical behaviour and ethical behaviour of the student. Learning bio refinery techniques and awareness of the possibilities of valorising biomass, create biobased products and interesting chemical content, also by practical.													
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	50%	55	36 to 5	N/A	38 to 7	N/A
2		x		x		Open question exam	8.1c, 8.2c	50%	55	2	3	4	6



**Semester 6**

<b>CU05600</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 Aquacultuur 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, presentation and defence 1.1a, 1.2b, 1.2c, 1.2d, 1.2e, 1.2f, 1.2g, 1.2h, 1.2i, 2.2a, 2.2b, 2.2c, 2.2d, 2.2e, 2.2f, 2.2g, 2.2h, 2.2i 5.1a, 5.1b, 5.1e	50%	5.5	23	25	27	28
2	X			X		Portfolio (competences, performance, appendix 8 of student manual) 1.1a, 1.3d, 1.1h, 5.1a, 5.1b, 5.1e, 5.1f 8.1a, 8.1b, 8.1d, 8.1e,	50%	5.5	23	25	27	28

**Semester 7**

<b>CU06725</b>	<b>Title:</b> Internship in company					<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 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		Final Evaluation (portfolio with evidence)	40%	5.5	N/A	N/A	N/A	N/A
2		X		X		Plan of approach, internship report	60%	5.5	N/A	N/A	N/A	N/A

**Semester 8**

<b>CU06726</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		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

2.2.6 Free composition courses (see article 3.12 art.6 CER HZ)  
No additions next to article 3.12.6 of the CER HZ.

2.2.7 Specialisations (article 3.10 CER HZ)  
The Chemistry programme offers the following majors:

- Applied Chemistry
- Life Sciences

Student 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.

2.2.7a Additional information on study programmes that are involved in the sector-wide conversion in the sector technology  
No additional information.

2.2.8 Work placement (article 3.9 CER HZ)  
The internship manual is available on the Chemistry website and is also available from the Academy Office. Students can start internship if they have passed all exams of S1 and S2. 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.

2.2.9 Minor (article 3.8 CER HZ)  
No additional requirements for advancement have been formulated for the minor.

2.2.10 Participation international exchange programme (article 4.5 CER HZ)  
The programme does not have an international exchange programme.

2.2.11 Graduating (article 3.9. EER)  
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 graduation manual 2017-2018 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.

2.2.12 Annulled

2.2.13 Annulled

2.2.14 Transitional arrangement (article 6.2 CER HZ)  
The Chemistry program 2017-2018 contains no transitional arrangements.

### 2.3 Study Advice

2.3.1 The student of the study programme Chemistry who receives a negative study advice will be disenrolled from this study programme

### 3.1 Establishment

3.1.1 The duration of the Implementation Regulations equals the duration of the Education and Examination Regulations HZ 2017-2018.

3.1.2 These Implementation Regulations are established by the Executive Board on 21/11/2017.