FACULTY OF SCIENCE
EDUCATIONAL INSTITUTE EXACT SCIENCES

Self-evaluation report

Bachelor Scheikunde

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ECTS credits: 180 EC

ECTS credits for course units in chemistry, physics, biology and mathematics: 150 EC

Academic year for introduction of the Eurobachelor label: 2006 – 2007 (The ongoing bachelor curriculum has been introduced in the academic year 2003 – 2004)

Entry qualifications for program: High school diploma with a focus on one of the subject clusters "Nature and technology" and "Nature and health".

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1. Outcomes: Subject Knowledge

The course units of the bachelor in chemistry are described in Appendix I and summarized in Table 1. The outcomes of the bachelor have been formulated in agreement with the Dublin descriptors given below. The precise formulations of the outcomes are given in the official education and examination regulations for the Bachelor in chemistry (Appendix II, in Dutch).

Dublin Descriptor	**Qualifications are awarded to students who**	Paragraph in the Education and examination regulations for chemistry (see appendix)
Knowledge and understanding	have demonstrated knowledge and understanding in a field of study that builds upon general secondary education and is typically at a level supported by advanced textbooks; such knowledge provides an underpinning for a field of work or vocation, personal development, and further studies;	1, 3
Applying knowledge and understanding	can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences as typically demonstrated through devising and sustaining arguments and solving problems within the field of study;	1, 2, A4
Making judgment	have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues;	2, 5, 6, A1, A3
Communication	can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences;	A2, A3, A5, A6
Learning skills	have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy.	1, 3, 4, A1

The Bachelor program (Table 1) provides the student with the knowledge and skills in agreement with the Dublin descriptors. The courses given in the first semester provide the students with the essential knowledge of chemistry, mathematics and physics. The course units in mathematics and general science are taken together with the first year students in mathematics, physics and astronomy.

Laboratory skills are developed in the first semester during a rudimentary practical course and a 3 weeks course at the end of the semester. The second semester includes courses in quantum chemistry, general chemistry and organic chemistry as well as a project concerned with the interaction between light and molecules. The first year is concluded with a more advanced practical course in organic and inorganic chemistry.

The second year of the bachelor comprises compulsory courses in physical chemistry (thermodynamics), inorganic chemistry, analytical chemistry, biochemistry and a general

course concerned with science, technology, society and ethics. Two periods are reserved for experimental work and each of these periods corresponds to a workload of 6 EC. In the second year, a total of 18 credits are reserved for optional courses. The students may choose between a restricted number of chemistry courses or courses in allied topics, such as mathematics or systems biology.

In the third year, a total of 36 credits are reserved for optional courses. This means that a total of 54 credits are allocated to optional courses during the second and third year of the bachelor. The restriction is that the students are required to spend 24 of the 54 credits on chemistry courses; that is, the students are obliged to choose two courses of 6 EC concerned with a relatively specialized topic in chemistry and two courses concerned with chemistry in a broad context (see below). A total of 30 EC may thus be earned by taking courses in other disciplines than chemistry.

Optional specialized courses:

- Molecular spectroscopy (6 EC)
- Quantum chemistry 2 (6 EC)
- Bio-organic chemistry (6 EC)
- Catalysis (6 EC)
- Thermodynamics 2 (6 EC)
- Molecular orbital theory (6 EC)

General courses:

- Chemistry of the living cell (6 EC)
- Chemistry of the earth and universe (6 EC)
- Chemistry of materials (6 EC)

The programme is concluded with a literature study (3 EC) and a bachelor project (15 EC). At the end of the bachelor, the students are awarded 3 EC for the “Academic competences” learning module and an additional 3 EC for a course unit termed “Orientation on research and profession”. The “Academic competences” module is an integral part of the various course units and the accomplishments of the students are evaluated throughout the bachelor programme.

In addition to the common Bachelor program of 180 EC, the excellent students can follow an honours program corresponding to a least 30 EC. A prerequisite is that a minimum of 6 credits are spent on courses in exact sciences and 6 credits are earned by following courses in other disciplines than chemistry, physics, mathematics and astronomy. The remaining credits can be earned by taking courses in exact sciences or selected topics from other study programmes.

TABLE 1.

a) YEAR 1

Module/course unit title	**Credits (ECTS)**	**Compulsory (C) Semi-optional (S) or Elective (E)**	**Total teaching hours**				**Pre-requisites (module) recommended**
			Lecture	Practical		Other[a]	
1st semester							
1.1 General chemistry: structure	6	C	26	0		26	
1.2 Symmetry and patterns in nature	6	C	26	0		39	
1.3 Mathematics 1	6	C	26	30[b]		26	
1.4 Laboratory skills and data treatment	3	C		84			
1.5 Structure determination	3	C	12			12	1.1
1.6 Laboratory course 1	3			84			1.4
1.7 Academic competences[d]	3	C	25				
2nd semester							
1.8 Energy and dynamics	6	C	28			28	1.1
1.9 Organic chemistry	6	C	20			20	1.1; 1.5
1.10 Quantum chemistry 1	6	C	32			54[c]	1.1; 1.3
1.11 Structure of matter	6	C	20			40	1.1, 1.2; 1.3
1.12 Laboratory course 2	6	C		168			1.1, 1.4, 1.9
1.13 Light and molecules[e]		C					

[a]Problem solving sessions or seminars unless otherwise is noted. [b]The practical part of the course involves an introduction to the program "Mathematica" as well as solving problems with this program. [c] Integrated form of problem solving and lecturing. [d] The "Academic competences" module involves in the first year a tutor program and the writing of a plan concerning the development of academic skills such as i) written and oral presentations, ii) information retrieval, and iii) reading of the chemical research literature. The "Academic competences" module is an integral part of the Bachelor with 3 EC being awarded in the first year. An additional 3 EC are awarded at the end of the bachelor program. [e] A small group of students executes a short practical project and presents their results for the entire group in the presence of a number of lectures. The project is not awarded separate credits because the theme "Light and molecule" is treated in several of the 1st year courses.

NATURE AND EXTENT OF OTHER LEARNING ACTIVITIES, e.g. guided study, team exercises: The students are also guided in their study by **i**) tutoring of senior students, **ii**) evaluation of presentations by teams of 2-4 students, and **iii**) performing projects as part of theoretical or practical course units. Each student has a digital portfolio with the achievements with respect to learning activities and other competences. The achievements are monitored as part of the Academic Competences unit.

b) YEAR 2

Module/course unit title	Credits (ECTS)	Compulsory (C) Semi-optional (S) or Elective (E)	Total teaching hours				Pre-requisites (module) recommended
			Lecture	Practical		Other[a]	
3rd semester							
2.1 Inorganic chemistry	6	C	26	32		24	1st year
2.2 Biochemistry	6	C	26			32	
2.3 Thermodynamics 1	6	C	26	26[b]		26	1st year
2.4 Chemistry of the earth and universe	6	S[c]	48				
2.5 Molecular spectroscopy	6	S[c]	26			26	1st year
2.6 Experimental course 1	6	C		160			
4th semester							
2.7 Analytical chemistry	6	C	22			24	1st year
2.8 Science, technology, society, ethics[d]	6	C	26				
2.9 Bio-organic chemistry	6	S[c]	24			26	1st year
2.10 Quantum chemistry 2	6	S[c]	26			16[e]	1st year
2.11 Systems biology	6	E	26			26	1st year, 2.2
2.12 Mathematics (advanced course)	6	S[c]	18			20	1st year
2.13 Experimental course 2	6	C		160			
2.14 Simulations and programming	6	E	26[f]			26[f]	

[a]Problem solving sessions or seminars unless otherwise is noted. [b]Discussion of theoretical problems and the use of Mathematica for solving thermodynamics questions. [c] The restriction in selecting courses (see text) implies that some of these courses can also be regarded as elective. [d]The course includes seminars by invited speakers and the students are requested to write an essay and present their work for the class. [e]The course also includes a project corresponding to a workload of 10 hours. [f] Integrated form of lectures, problem solving sessions and programming.

NATURE AND EXTENT OF OTHER LEARNING ACTIVITIES e.g. guided study, team exercises: Each experimental course unit is concluded with a mini-symposium with presentations of the results of 2-3 students for the entire group and the teaching staff.

c) YEAR 3

Module/course unit title	Credits (ECTS)	Compulsory (C) Semi-optional (S)[a] or Elective (E)	Total teaching hours				Pre-requisites (module) recommended
			Lecture	Practical		Other[a]	
5th semester							
3.1 Chemistry of the living cell	6	S	48				2.2
3.2 Chemistry of functional materials	6	S	48	20			1st and 2nd year
3.3 Chemistry of the earth and universe (same as 2.4)	6	S	48				
3.4 Molecular spectroscopy (same as 2.5)	6	S	26			26	1st year
3.5 Catalysis	6	S	22	34		34	1s and 2nd year
3.6 Thermodynamics 2	6	S	16	16		16	1s and 2nd year
6th semester							
3.7 Bio-organic chemistry (same as 2.9)	6	S	24			26	1st year
3.8 Quantum chemistry 2 (same as 2.10)	6	S	26			16[c]	1st year
3.9 Mathematics (same as 2.12)	6	S	18			20	1st year
3.10 Molecular orbital theory	6	S	24	24		16	1s and 2nd year
3.11 Literature discussion	3	C					
3.12 Bachelor project	15	C					
3.13 Academic competences[c]	3	C	25				
3.14 Orientation on research and profession[d]	3	C	4				

[a] Problem solving sessions or seminars unless otherwise is noted. [b] The restriction in selecting courses (see text) implies that some of these courses can also be seen as elective. [c]The literature discussion is a joint effort by 2-3 students under the guidance of a lecturer. [d]The 3 EC are awarded at the end of the bachelor on the basis of the activities by the student in the 2nd and 3rd year of the study. [e] The course unit involves i) participation in a symposium organized by the student societies from the chemistry departments at the University of Amsterdam, The Free University and the University of Utrecht, ii) following a series of lectures by alumni, iii) setting up a personal education plan, and iv) visits to other institutions (obligatory).

NATURE AND EXTENT OF OTHER LEARNING ACTIVITIES e.g. guided study, team exercises: The students may also follow courses from other disciplines (for example biology) provided that the total workload does not exceed 30 EC.

TABLE 2

Outcomes: Subject knowledge

Aspect of chemistry	Treated in module/course unit[a]
a) Major aspects of chemical terminology, nomenclature, conventions and units	1.1; 1.9; 2.1; 2.3
b) The major types of chemical reaction and the main characteristics associated with them	1.1; 1.8; 1.9; 2.1; 2.9
c) The principles and procedures used in chemical analysis and the characterisation of chemical compounds	1.5; 1.6; 1.12; 2.5; 2.7
d) The principal techniques of structural investigations, including spectroscopy	1.5; 1.6; 1.12; 2.5
e) The characteristics of the different states of matter and the theories used to describe them.	1.11; 2.3; 3.2; 3.6
f) The principles of thermodynamics and their applications to chemistry	1.8; 2.3; 3.6
g) The principles of quantum mechanics and their application to the description of the structure and properties of atoms and molecules	1.1; 1.10; 2.10
h) The kinetics of chemical change, including catalysis; the mechanistic interpretation of chemical reactions	1.8; 1.9; 2.1; 2.9; 3.5;
i) The characteristic properties of elements and their compounds, including group relationships and trends within the Periodic Table	1.1; 2.1
j) The structural features of chemical elements and their compounds, including stereochemistry	1.1; 2.1
k) The properties of aliphatic, aromatic, heterocyclic and organometallic compounds	1.9; 2.1; 3.5; 3.7
l) The nature and behaviour of functional groups in organic molecules	1.5; 1.6; 1.9; 1.12; 2.9
m) Major synthetic pathways in organic chemistry, involving functional group interconversion and carbon-carbon and carbon-heteroatom bond formation	1.6; 1.9;1.12; 2.9
n) The relation between bulk properties and the properties of individual atoms and molecules, including macromolecules (both natural and man-made), polymers and other related materials	1.11; 2.7, 3.2
o) The structure and reactivity of important classes of biomolecules and the chemistry of important biological processes.	2.2; 2.9; 3.1

[a] The topics listed in the table represent key-issues in a number of course units. The numbers given refer to the relevant courses given in Table 1 (see also Appendix I).

TABLE 3.

Outcomes: Generic Competences

1.1 The capacity to apply knowledge in practice, in particular problem-solving competences, relating to both qualitative and quantitative information.

The capacity to apply knowledge in problem-solving is an integral part of nearly all course units. The students also submit homework that is evaluated by the lecturer and discussed during the subsequent problem-solving sessions. The homework as well as the problems addressed during the sessions can be of a qualitative or quantitative nature depending on the nature of the topic of a given course.

1.2 Numeric and calculation skills, including such aspects as error analysis, order-of-magnitude estimations, and correct use of units.

These skills are developed during the first year laboratory course (1.4) and evaluated in the form of a short examination. Estimation of the orde-of-magnitude is part of courses such as “Symmetry and patterns in nature” (1.2), Mathematics 1 (1.3), Energy and dynamics (1.8), Quantum chemistry (1.10), Structure of matter (1.11) and the courses in thermodynamics (2.3 and 3.6). All these courses involve training in the correct use of units.

1.3 Information-management competences, in relation to primary and secondary information sources, including information retrieval through on-line computer searches.

Competences in literature searches (in part with on-line computer services) on a given topic is trained during the courses in which a presentation is given (for example course unit 1.2) and during the practical courses (1.6, 1.12, 2.6, 2.12). More advanced literature searches are an integral part of the unit “Literature discussion” (3.11) and the Bachelor project (3.12).

1.4 Ability to analyze material and synthesize concepts.

The ability to analyze material is part of all practical course units (1.6, 1.12, 2.6, 2.13) and also the courses in Analytical chemistry (2.7) and Inorganic chemistry (2.1).

1.5 The capacity to adapt to new situations and to make decisions.

These competences are developed throughout the Bachelor program and form an integral part of the course units concerned with “Academic competences” (1.7 and 3.13).

1.6 Information-technology skills such as word-processing and spreadsheet use, data-logging and storage, subject-related use of the Internet.

Such skills are developed during high school in the Netherlands and applied in the practical courses (1.6; 1.12; 2.6; 2.13) units; data-analyses is part of the practical course 1.4; the use of information-technology is encouraged during most course units and is an essential part of the "Literature discussion" course (3.11).

1.7 Skills in planning and time management.

Planning and time-management is trained during the "Academic competences" (1.7 and 3.13) and the skills are evaluated during the tutoring program in the first year. The skills in planning are also developed during the course in Literature discussions (3.11) and the bachelor project (3.12).

1.8 Interpersonal skills, relating to the ability to interact with other people and to engage in team-working.

Team working is an essential part of the practical course units (1.6; 1.12; 2.6; 2.12); in addition, the "Literature discussion" course involves teamwork (3.11).

1.9 Communication competences, covering both written and oral communication, in one of the major European languages (English, German, Italian, French, Spanish) as well as in the language of the home country.

The official language of all Bachelor programme is Dutch and the students are obliged to write their reports in Dutch including the report on the results of the Bachelor project. The text books are mostly in English. Dutch students, however, experience no difficulty in reading English books (or research articles) and are capable of expressing themselves in English (both in written and oral form).

1.10 Study competences needed for continuing professional development. These will include in particular the ability to work autonomously.

The individual study competence is developed during the entire Bachelor and is also part of the "Academic competence" course units (1.7 and 3.13). During the Bachelor project the student work autonomously under the guidance of a PhD student or a lecturer.

1.11 Ethical commitment

No comment.

2. Outcomes: Chemistry-based Practical Skills

The total number of credits allocated to pure practical course units is 24 EC. Experimental laboratory work is part of the course “Inorganic chemistry” (2 EC) and the semi-optional course “Catalysis” (2 EC). The bachelor project involves for most students experimental work, for example in synthesis, catalysis, photonics or analytical chemistry.

The practical course units 1.6 and 1.12 (see Appendix I) involve experimental hands-on laboratory work according to given instructions. During these courses the students work in groups of 2 under the guidance of teaching assistants (about 1 assistant per 6 students).

The practical course units, 2.6 and 2.13, can involve hands-on laboratory work or more theoretical work depending on the precise program that is followed by a group of students.

3. Content

3.1 The bachelor program comprises 180 EC (excellent students can follow an Honours program consisting of a minimum of an additional 30 EC).

3.2 The maximum size of the course units is 6 EC and 3 EC is the average minimum number of credits awarded to a course unit.

3.3 The student may choose from an extended list of semi-optional or elective course units (Table 1). The present bachelor program was initiated in the academic year of 2003-2004 but so far the students take typically the courses: “Chemistry of the earth and universe” (6 EC); “Molecular Spectroscopy” (6 EC), “Bio-organic chemistry” (6 EC), “Catalysis” (6 EC); “Chemistry of the living cell” (6 EC).

3.4 The program involves a minimum of 150 EC carried by course units in chemistry, physics, biology or mathematics.

4. Distribution of credits

4.1 The core of the program comprises 150 credits in agreement with the Eurobachelor document.

4.2 and 4.3 In addition to courses in the subdisciplines organic chemistry, inorganic chemistry, physical chemistry, analytical chemistry, biochemistry, the program offers chemistry courses in functional materials, catalysis, chemistry of the earth and universe, and a course in molecular orbital theory (see Table 1). Course units in other topics than chemistry include a compulsory

course in “Science, technology, society and ethics” and lessons in mathematics or computer programming.

In the bachelor program, 30 EC are reserved for elective courses (see Section 1). The elective courses may concern chemistry or other areas of exact sciences as well as biology. The elective courses may also involve other topics than science such as languages or economics depending on the interest of the student and the availability of these courses. A prerequisite is that at least 15 of the 30 EC are allocated to elective course with a level corresponding to the 2nd year (or higher) of the selected academic discipline.

4.4. A language course is not offered as Dutch students can be considered proficient in English. However, an advanced course in English (about 2 EC) will be offered in the next academic year as part of the “Academic competences” module.

4.5 The study advisors offer assistance in the selection of appropriate course units for the 30 EC that can be earned by following elective courses. Students with an interest in courses in a discipline of another faculty (for example social sciences or humanities) can obtain assistance from the educational institutes of the appropriate faculty.

5. ECTS and student workload.

5.1 The academic year starts in September and continues until about 1st of July. On average the students are expected to spend 42 weeks on their study composed of a period of 40 weeks with course units and 2 weeks for reexaminations. Each semester is divided into two periods of 8 weeks and one period of 4 weeks.

5.2 The program is arranged in such a way that the average student spends about 40 hours each week on the study.

5.3 The lectures are requested to develop their course unit in agreement with the fact that a theoretical course unit of 6 EC corresponds to a total of 52 hours of lectures and problem solving sessions. In the period of 8 weeks, the students will receive 8 hours of teaching per week (per course unit) in order to leave ample time for the preparation for the final exam for a particular course. The average students follow two course units of 6 EC in parallel meaning that 16 hours per week is spend on participating in lectures/problem solving sessions and 24 hours can be devoted to homework, reading the textbooks and handouts.

For a practical course of 4 weeks, the students are expected to spend 40 hours a week on the preparation of the experiments, performing the experiments, writing the reports and presenting the results for the total group of students. An overview of the estimated workload per year is given below.

	Lectures	**Problem solving**	**Practical courses**	**Project**	**Preparation**	**Total workload**
1st year	207	217	366	44	834	1680
2nd year	200-240	132-160	378-458		ca. 900	1680
3rd year	164-240	70-145	0-86	504-530	ca. 900	1680

5.4 The courses are evaluated during the semester by two discussion sessions with selected students and also in written form after the final exam. The actual workload of the students is part of the evaluations of the courses and feedback is given to the lectures of the courses either in the discussions with the students or in written form (see also Section 11).

6. Module/Course Units and Mobility

6.1 In principle, mobility is possible in all years with the exception of the first semester. The prerequisites for mobility are: **i**) that courses are followed at a recognized institution, and **ii**) that these courses are at a level that is comparable to the corresponding course at the home-institution. The mobility of students is expected to be more advantageous in the 3rd year than in the 1st and 2nd year.

6.2. The non-transferable course units are: “Literature study” (3 EC), “Academic competences” (6 EC) and “Orientation on research and profession” (3 EC).

7. Methods of Teaching and Learning

7.1. In the first semester of the bachelor, tutoring is part of the “Academic competences” course module. In the remaining part of the study, tutoring is not an integral part of program even though counselling is available if considered necessary. During the bachelor programme the students receive information concerning the possible choices between semi-optional and elective courses. Individual students can discuss the possibilities with the counsellors and/or the lectures in order to select courses that are suited for his or hers interest and skills.

7.2 – 7.7. The theoretical courses are given in the form of lectures (2 x 45 minutes) followed by problem solving sessions of 2-3 hours in groups of 10 – 15 students. With respect to the 1st year of the study, the students are requested to submit their homework at the beginning of a problem solving sessions or to perform a short test with straightforward questions prior to start solving problems either individually or in small groups. Homework is less frequently applied during the 2nd and 3rd year theoretical course units.

Teamwork is an essential part of the practical courses and is also stimulated during the problem solving sessions and course units such as the “Literature discussion”. Students are also free to discuss their homework even though the completed problems are submitted individually. The Bachelor project is carried out individually and most students perform an experimental or theoretical study in one of the research groups of the Chemistry Department. In principle, a Bachelor project can be carried out at an industrial research facility provided that a lecturer at the Chemistry Department supervises the project. Credits will then be provided as if the student had performed the project at the Chemistry Department.

An electronic learning environment (such as “Blackboard”) is used for most course units either to provide students with course information and documents or as a means for submitting completed homework. The students have also access to more advanced programs such as Mathematica and Spartan; both programs are introduced during the courses in the 1st and 2nd year of the programme.

7.8 Students can be elected for the student counsel of the Faculty (this counsel advises the dean in student affairs as well as other aspects of the Faculty policy) and the committee for the evaluation of the chemistry programme. In addition, most students participate actively in the local society for chemistry students either by organizing social activities, inviting alumni to give lectures or by organizing excursions to chemistry departments and industries in other European countries.

8. Assessment procedures and performance criteria

8.1. The assessment is carried out at the end of each course unit. In the 1st year of the study, the assessment of the theoretical course units is based upon **i**) the marks given to homework; **ii**) the marks of a test given during the course and **iii**) the final exam. Typically, the final mark is estimated as a weighted average of these marks; for example; the final mark for the course "General chemistry: structure" is obtained by the following algorithm: 0.2 x mark of homework + 0.2 x mark of midway test + 0.6 x mark of final exam. Similar procedures are followed by the other theoretical courses in the 1st year and all procedures are communicated to the students participating in the course. In the 2nd and 3rd year, the assessment is based largely on the exam at the end of the course. For the practical courses, the mark is based upon the reports, the skill in performing the experiments, the attitude during the practical work and the preparation of the work to be done.

8.2 Comprehensive examinations at the end of the study programme are not given.

8.3 Nearly all examinations are given in a written form. Oral reexaminations may take place and will involve the main lecture of a course in combination with a second examiner.

8.4 The written exams are evaluated by the main lecturer as well as a second examiner (often the lecturer responsible for the problem solving sessions). The written exams are prepared by the main lecturer of a course and mostly evaluated by the lecture(s) for the problem solving sessions.

8.6 – 8.7. The maximum time allocated to a written examination is 3 hours and the marks are passed on to the individual students by the administration office (by letter, sms or email). No lists with names of students and their marks are circulated.

8.8 Previous exams with answers to the problems are available for most courses and can be discussed during the problem solving sessions at the end of a course. In addition, the completed exam is often made available to the students after the exam. Students are also encouraged to contact the main lecture of a course for a discussion of their answers to questions of the final exam.

8.9 A special examination board for the approval of written exams does not exist at the Department of Chemistry (see also 8.4).

9. Grading

The Dutch grading system is based upon a scale of 0 – 10 and this scale is used for home-students as well as mobile students. An explanation of these grades is given to the students in the European Diploma Supplement (Appendix IV).

The course units are concluded with an examination and a final mark for the course is given by the lecturer responsible for the course. The final marks are discussed with all lectures involved in a given course and can only be given by authorized personnel i.e. academic staff members. The marks are given in agreement with the education and examination regulation for the Educational Institute Exact Sciences (Appendix II). In addition, the examination committee for the chemistry programme evaluates the procedures for assigning marks to the completed examinations, report of practical work and the final report for the bachelor project.

Conversion of these grades into ECTS grades can be performed for mobile students; the conversion is executed by the administration office of the learning institute according to the following:

Dutch grading (UvA)			ECTS grading
10%	8.1 – 10.0	excellent: outstanding performance with only minor or no errors	A
25%	7.5 – 8.0	very good: above the average standard, but with some errors	B
30%	7.0 – 7.4	good: generally sound work with a number of notable errors	C
25%	6.1 – 6.9	satisfactory: fair, but with significant shortcomings	D
10%	5.5 – 6.0	sufficient: performance meets the minimum criteria	E
	- < 5.5	fail: some more work required before the credit can be awarded	F

10. The Diploma Supplement

The European Diploma supplement (in English) will be issued together with the Dutch Bachelor diploma for all students (see Appendix IV).

11. Quality Assurance

The assessment of the bachelor programme takes place on three different levels:

- *Individual courses*: three times per semester there is an oral assessment of the individual courses. At these meetings a number of the students and the lecturers are present. These meetings are held during the course in order to be able to solve minor problems. If a problem can not be solved during the course, appointments are made with the lecturers in order to improve the course next academic year. At the end of every individual course, a written evaluation is held to give the individual students an opportunity to give his or her opinion of the entire course.

- *Semester/year evaluation*: twice a year the programme director organizes a meeting with all lecturers involved in the course units in order to assess the semester or the entire academic year. In addition, once a year a meeting is held with all students of one group with the

purpose of evaluating the content and organization of the programme for the academic year in question. Also, the assessment of the individual courses of a given semester is discussed.

- *Complete bachelor programme*: the complete bachelor programme will be assessed by three different parties: **i**) students, **ii**) the professional field and **iii**) the alumni. Students fill in an evaluation form at the moment they have finished the bachelor programme. The professional field and the alumni assess the programme every three years either during a meeting or by completing a written inquiry.

The coordination of the assessment is the responsibility of the quality manager of the Educational Institute Exact Sciences. Two master students carry out the assessment of the individual courses.

The results of the assessments (available in written form) are subject to discussions by the committee responsible for the evaluation of the chemistry programme. The main task of the committee is to advise the chemistry programme director and the director of the Educational Institute Exact Sciences. The committee consists of an equal number of students and lecturers and holds meetings every six to eight weeks.

12. Employability

The present Bachelor-Master system at Dutch Universities was introduced in the academic year 2003-2004. The first group of students to receive a Bachelor degree in chemistry from the University of Amsterdam will graduate in summer 2006. At present, all Bachelor students are expected to continue their study at the Master level either at the home-institution or at another university in the Netherlands or abroad.

At present the employability of students with a Bachelor degree in chemistry is uncertain. The Dutch industries may very well prefer students with a degree in chemistry (at the level of a laboratory technician) from one of Dutch universities of professional education (“Hogescholen”, see also Appendix IV).

Statement of Applicant

I hereby agree that this institution will, if awarded the Eurobachelor label, recognise Bachelor degrees in chemistry awarded by other institutions holding the Eurobachelor label as providing automatic right of access (but not of admission) to chemistry Master programmes offered by this institution.

Full name: Prof. dr Henk Hiemstra,

Position as: Programme director chemistry education

Date…….. Signature…….…….