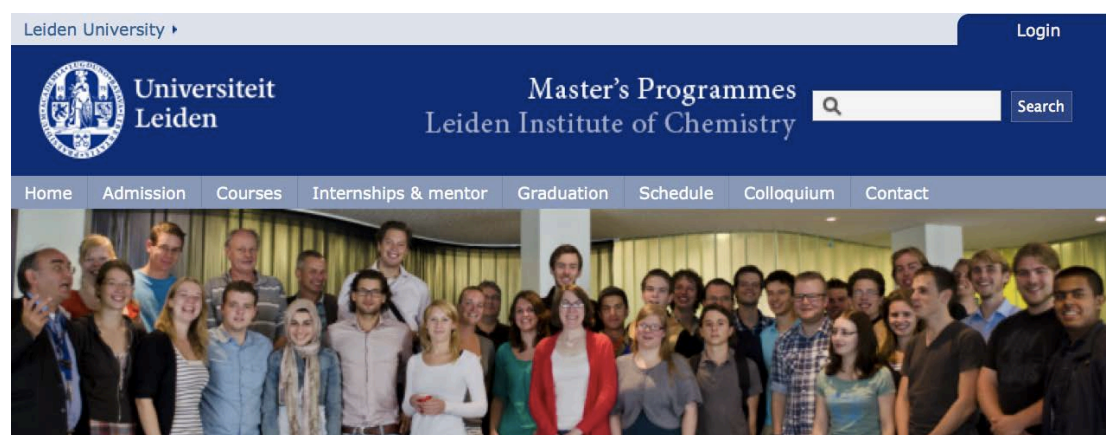


Study Guide

Master program **Chemistry**



Study year 2014-2015



Program, rules, schedules of the master program Chemistry

- Program information <https://masters.lic.leidenuniv.nl/programmes/chemistry>
- Admission & enrolling in the program <https://masters.lic.leidenuniv.nl/admission>
- Schedule information <https://masters.lic.leidenuniv.nl/download-schedule>
- Course registration <https://masters.lic.leidenuniv.nl/registration-exams>
- Contact information <http://masters.lic.leidenuniv.nl/contact>

You can find us on Blackboard Leiden (Sch-MSc-0910FWN). You can enrol yourself after which we will approve your enrolment. By enrolling you check if you have access to our ICT resources and are properly registered.

You can also create an account on our website using your student number to create your first master plan.

<https://masters.lic.leidenuniv.nl>

Version July 21, 2014

The faculty staff compiled this study guide with the greatest care. However, further details concerning a number of subjects will only be available after the guide has been published. For that reason, the information published in this study guide may be subject to change. Amendments, further details, and a more extensive description of the subjects can be found on the Blackboard site: blackboard.leidenuniv.nl.

Direct information can be found on our website <http://masters.lic.leidenuniv.nl>, which includes up to date agenda items and links to the room reservations.

Important note to students:

The University uses your U-mail account as primary e-mail address. If you do not check this mail account regularly, forward this account automatically to another e-mail address to keep receiving all official mail (including uSis mail).

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Words of welcome

Dear students,

Chemistry is the central science enabling a healthy future in a sustainable society. Chemistry researchers at Leiden University take a fundamental approach in finding tailored solutions for complex societal problems in human health and environmental issues. The Leiden Institute of Chemistry (LIC) is the basis for research and collaborations of the Leiden chemistry groups. In the past few years the research groups in the LIC have been restructured, to strengthen collaborations and increase synergy. Based on these changes the Chemistry master program has been totally reorganised and updated to offer you advanced and specialised courses of our young and enthusiastic staff.

In your hands you now have the study guide for the MSc program Chemistry offered by the LIC. The MSc program in Chemistry offers four different specialisations, each with a choice of two research areas: 'Chemical Biology' and 'Energy & Sustainability'. These areas correspond to the new major research areas in the LIC.

Starting from day 1, and during your whole master program, you will be a member of an internationally renowned research team of choice in the LIC. Your research internship will be complemented with high-level lecture courses to optimally prepare you for a career in academia or industry. Guided by your individual mentor, you may assemble a tailor-made educational program for an optimal training to become a chemistry professional.

On behalf of the Educational staff and all the teachers of the Chemistry program I wish you a very successful and creative year in an inspiring and pleasant atmosphere.

Prof. dr. Lies Bouwman
Director of Education

Dear future academics,

The [Leiden Institute of Chemistry](#) houses the research groups in Chemistry and Life Sciences. Our environment and quality of life is largely determined by chemistry, therefore research at the forefront of molecular and the life sciences is of utmost importance for our future. For example, the next generation of solar cells or batteries, and the improvement of existing as well as the development of new drugs rely on smart chemical solutions. Knowledge of catalysis, synthesis and biological processes on molecular scale will enable us to discover novel processes and products that range from new materials to pharmaceuticals. The chemistry and life science research in the Leiden Institute of Chemistry is organized around two major research areas: Chemical Biology and Energy & Sustainability. These themes illustrate the central position of chemistry and life sciences between biology, medicine and physics. The various research topics carried out within these themes are ideal for executing interdisciplinary research. Within the Life Sciences and Chemical Biology, the Cell Observatory was recently founded for the study of living systems from organisms, cells, and molecules down to atomic structures unravelling fundamental and disease-related processes. The Leiden Institute of Chemistry attracts students from all over the world either to conduct their full training or to participate in foreign exchange programs.

Prof. dr. Jaap Brouwer
Scientific Director of the Leiden Institute of Chemistry

People in the program

Function	Name & E-mail	Phone
Program Director	Prof. dr. E. Bouwman bouwman@chem.leidenuniv.nl	4550
Study coordinator*	Dr. M.E. Kuil m.kuil@chem.leidenuniv.nl	4416
Board of Admissions	Dr. E.M. Blokhuis, e.blokhuis@chem.leidenuniv.nl	4542
Board of Examiners	Prof. dr. G.J. Kroes g.j.kroes@chem.leidenuniv.nl	4396
Chairman Educational Committee	Dr. M. Overhand overhand@chem.leidenuniv.nl	4483
Graduate School Office**	Drs. C. M. van den Berge berge@edufwn.leidenuniv.nl	5762
International Office	Ms. G. Schildwacht schildwacht@edufwn.leidenuniv.nl	5783
Laboratory Safety / Safety coordinator	Mr. M.F.J. Fluttert amd@science.leidenuniv.nl	4333
Specialisation Science Based Business	Dr. H. Jousma jousma@sbb.leidenuniv.nl	4424
Specialisation Science, Communication & Society	Prof. dr. J. van den Broek broek@science.leidenuniv.nl	5672
Specialisation Education	Drs. W. van der Wolk wolk@iclon.leidenuniv.nl	4023

Phone: internal phone numbers

International numbers dial first +31-71-527-....

* Office hours study coordinator:

Tuesday & Wednesday 10:00–12:00, walk in (Room HB-219).

Otherwise by appointment via e-mail m.kuil@chem.leidenuniv.nl

** Office hours Graduate School Office (“Educatief Centrum”):

Monday to Thursday 10:00–15:00, Room HB-206, Gorlaeus Laboratories

Otherwise by appointment via e-mail berge@edufwn.leidenuniv.nl

Entry and start of the program

Admission

Students from any university in The Netherlands with a BSc degree in Chemistry or with a BSc Major in Chemistry will be admitted to the program.

All other (international) candidates, students with a degree related to Chemistry such as BFW or LST, HBO Bachelors and foreign students have to apply for admission and can apply on-line via <http://en.mastersinleiden.nl/arrange/admission>. The Board of Admission will review all on-line applications. Please notify the study coordinator if you plan to apply on-line.

The Board of Admissions will judge the qualifications of the applicant on the basis of the curriculum and grades of his/her previous training. The admission process may include an interview with the Board of Admissions. Foreign applicants must provide proof of proficiency in English (IELTS level ≥ 6.5). Applicants for the Education or Science Communication and Society specialisations must provide proof of proficiency in Dutch. Admission is possible throughout the year, but we advise (foreign) students to start in September or February. Additional student information is available on our website <https://masters.lic.leidenuniv.nl> and from the Foreign Admission Office of the Leiden University.

Students wishing to enrol the Chemistry master program at the Leiden Institute of Chemistry should consult the webpages:

<http://www.students.leiden.edu/application-admission/master>

<https://masters.lic.leidenuniv.nl/admission>

To get the most up-to-date information or personal advice in a consult, contact the study coordinator. For all candidates the admission rules apply as stated in the Faculty “OER”. For further information consult the faculty website: <http://www.science.leidenuniv.nl>.

Talented students admitted to the master Chemistry can apply for admission to one of four National Graduate Schools (see page 14).

At the start of the program

All admitted students in the program must be registered at Leiden University **and** Studielink as an MSc student before the start of their studies. All admitted students have to make an appointment for an intake interview with the study coordinator, who will explain the use of the master planner tool and the role of the mentor. Appointments can be made by e-mail: m.kuil@chem.leidenuniv.nl. Students who need help with their choice of the research area, specialisation or mentor should contact the study coordinator for advice.

Mentor system

All mentors are appointed by the board of the program and are experienced “Principal Investigators” (PI). A list of the PI’s and a brief summary of their research interests can be found on the master website (see also page 23). Each student chooses a mentor in a research field related to the selected research area; the mentor will be the student’s personal coach during the complete master program. When a mentor accepts this role the student and mentor together will compose a tailor-made study program. The students will conduct their research work under supervision of their mentor.

The web-based master planner is used for planning and registration of your study program, and is to be filled in in consult with your mentor. Student and mentor regularly (at least once every six months) discuss the study progress with the aid of master planner. The student will report the results of examinations and courses and may provide the mentor with a printout of the exam results using the uSis system (see page 25). It is the student's responsibility to contact the mentor for these regular discussions.

Master planner

Student can create a login on our website and add their master plan to their own profile. The student, mentor and study coordinator can view the master plan and monitor the student's progress. <https://masters.lic.leidenuniv.nl/registration>

After creating your own account you can use our website to plan your studies, download forms, and arrange your research internship evaluation on-line. For questions about the master planner you can contact the study coordinator.

International Students Support

Leiden University has arranged a special portal for the support of international students: <http://www.students.leiden.edu/your-study/guidance>.

Rights and obligations of students

In the Student Charter ('Studentenstatuut' in Dutch) all rights and obligations of students, the University, Faculty and the programme are laid down. Besides being a collection of all rights and obligations, the Student Charter also lists all facilities provided by the University available to students. The charter also contains an overview of the legal protection of students. The rights and obligations laid down in the Student Charter are derived from the legislation of the Higher Education and Research Act ('Wet op het Hoger Onderwijs en Wetenschappelijk Onderzoek', WHW). Every student is deemed to have taken notice of all parts of the Student Charter.

The charter comprises two parts. The Institutional part is equal for all students and can be found on the website of the University and a hard copy is made available at PITSstop (Information and Support Services & Information Desk Plexus Student Centre).

The departmental part of the charter addresses students of a specific programme and comprises two parts:

- Course and Examination Regulations (OER in Dutch), and
- Rules and Regulations for the examinations, practicals and final examinations (R&R).

In the OER and R&R a.o. the rules of the Faculty regarding admission, examinations, the degree programme and organisation are laid down. **This information can be found on** http://www.science.leidenuniv.nl/index.php/english/education/oer_msc_programmes/

Program structure

Specialisations

The MSc Chemistry program offers four specialisations:

- Research in Chemistry (CHEM)
- Chemistry & Education (EDU)
- Chemistry & Science Communication and Society (SCS)
- Chemistry & Science Based Business (SBB)

More information on contents of the different specialisations is given at 'Specialisation specific components' (see page 12). Within each specialisation students have to choose one of the research areas Chemical Biology or Energy & Sustainability.

Research areas

In the area **Chemical Biology** at the Leiden Institute of Chemistry, research is characterized by studying and influencing physiological processes at the molecular level. Fundamental biological problems are addressed using intrinsic chemical approaches and concepts. The driving force behind the Leiden Chemical Biology research is the ability to design functional molecules that can be used to investigate and influence bio-molecular interactions and structures. The Leiden Chemical Biology research is inspired by physiological processes that underlie human diseases. The ultimate goal is to contribute to human health through conceptually new methods for diagnosis, drug development and new therapies for diseases.

In the area **Energy & Sustainability** at the Leiden Institute of Chemistry research is focused on chemical reactions of importance to the sustainable and efficient production and storage of energy, as well as the subsequent usage of stored energy, on a fundamental level. The Leiden research on Energy & Sustainability employs advanced spectroscopic techniques, nano-imaging, inorganic synthesis, and theoretical methods to elucidate the molecular processes that are at the basis of the conversion of solar energy to chemical energy. In addition, new catalysts, materials, and molecular and supramolecular systems are being developed and investigated, especially for cyclic redox chemistry of the hydrogen-oxygen cycle, with attention for the reversible storage of hydrogen, and for the carbon cycle, in which the sustainable and reversible conversion of carbon dioxide into a liquid carbon-rich fuel is a central challenge. The ultimate aim is to make a fundamental contribution to a sustainable cyclic chemistry, which is efficient, scalable and robust.

More detailed information on the specific topics of the various research groups and the researchers can be found via our website <http://masters.lic.leidenuniv.nl>.

Composition of each study program

The distribution and size of the compulsory components of the MSc program depends on the specialisation and comprises the research internship (30-60 EC) and four compulsory courses (24 EC) to be selected from one of the two research areas *Chemical Biology* or *Energy & Sustainability*.

Students in the EDU, SCS or SBB specialisation need to follow modules specific for a specialisation (30-60 EC) and therefore have a reduced Chemistry program (90-60 EC).

The compulsory Chemistry modules in all specialisations comprise a research internship (at least 30 EC) and four core courses (24 EC). Students in the research specialisation train their communication skills via the essay and colloquium (6 EC).

Each specialisation thus comprises four main components:

- Research Internship and Thesis Talk
- Core course components of the research area
- Electives
- Specialisation specific components

Research Internship

The research specialisation comprises research internships to a total of at least 60 EC, including a presentation for the group and a written report (the master thesis); for the other specialisations the Chemistry program comprises an internship of at least 30 EC. The 60 EC for internship in the research specialisation may be split over two internships: the major and minor internship, with the limitation that the major research internship comprises at least 40 EC.

The major research internship is carried out in the LIC under the supervision of the mentor, and for students in all specialisations will be concluded with a Thesis Talk (see below). The mentor guides the student with their research project(s) and will advise which courses best fit in with the research topic and study planning.

The optional 'minor' internship comprises at least 20 EC, including a presentation for the group and a written report, and can be carried out in another research group of the LIC, another institute (within the Netherlands or abroad), or in a company. Students of the research specialisation are encouraged to carry out a 'minor' project abroad (see also page 27). The duration of an external project is preferably three to four months based on full-time attendance. All external research projects must be discussed in advance with the mentor and study coordinator, are carried out under the responsibility of a member of the LIC permanent staff (not necessarily the mentor), and need prior permission from the Board of Examiners.

The total duration of the research project(s) is based on full-time attendance. Generally a month of full-time work (40 h per week) equals 6 EC. This means that courses attended during the research period will lead to an extension of the duration of the internship. Also, insufficient attendance or lack of diligence can lead to an extension of the duration of the internship. In special cases the project may be provisionally awarded with part of the assigned credits (without a grade), notably for foreign students who need to provide proof of their study progress to the IND.

Before the start of any internship the student and mentor/supervisor have to complete an internship agreement. This digital form is created online at the LIC master site (<https://masters.lic.leidenuniv.nl>) by the supervisor/mentor and is approved (digitally 'signed') by the student. The mentor/supervisor, student and study coordinator can view this agreement online.

The grading is done using the digital research internship evaluation form (<https://masters.lic.leidenuniv.nl>). The signed form and a pdf file of the final version of the

master thesis are submitted after grading to the group administration and uploaded at the LIC master site. However, before a final grade can be given the student should submit the final Master thesis to the study coordinator for the jury of the Thesis Talk (see below).

Thesis Talks

All master students prepare a master thesis during their studies and present their research results in a Thesis Talk that is organized preferably on Wednesday afternoon or alternatively on Thursday afternoon in the Cell Observatory Lecture Room. The current agenda can be found in the list of upcoming events on the website <https://masters.lic.leidenuniv.nl>.

Practical considerations concerning the Thesis Talk

- Students who started after September 2013 have to attend 10 Thesis Talks; students who started before that date have to attend at least 5 Thesis Talks. The Thesis Talks can be registered on the colloquium attendance list (see also page 12). You must attend a few Thesis Talks before you give your own presentation.
- A Thesis Talk is booked via e-mail to the program coordinator, the mail contains:
 - the final digital version of the internship report
 - the approval of the supervisor/mentor
 - the title of the talk and the names of the two evaluators of the report
 - a proposed date agreed upon with the evaluators.

This information will be used to announce your Thesis Talk title, time and location and the Thesis Talk jury on the master's web site.

- We strongly advise all students to give a rehearsal talk. Note that your thesis talk may be very suitable for a future job application.
- The student has to organize the required equipment for the thesis talk. Make sure your laptop, pointer, white board markers etc. are in good shape!
- The mentor must provide a printed version of the evaluation form for the jury.
- Immediately after the talk(s) the jury discusses their findings with the supervisor(s) and/or mentor(s) who will propose their grading. The jury cannot judge an internship of at least 30 EC based only on a thirty minutes presentation, but will acquire a good impression of the research discussed in the presentation.
- The jury reports to the study coordinator and their findings are discussed in the educational forum.
- The jury consists of experienced researchers who are selected based on their affinity with the topic and their independence from the investigation discussed. The program coordinator establishes the jury.

Core courses

The two research areas offer a number of core courses that are indispensable to and cover the different research projects carried out within these research areas. Depending on the choice of the research area, students make a choice of 24 EC of these core courses (see page 15) in consult with their mentor.

Students in the research area Chemical Biology have a choice of 4 courses from a list of 8 core courses. The choice is made in consult with the mentor and depends not only on the choice of the research internship, but also on the prior education of the student.

Students in the research area Energy & Sustainability have to do two compulsory courses (Spectroscopy and Modern Quantum Chemistry) and have a choice of 2 courses from a list of 4 core courses.

Students in the Education specialisation may select 4 core courses of their chosen research area; however, they are advised to take also courses from the other research area to get a broader background knowledge of chemistry that is indispensable for teaching.

Electives

The electives consist of a free choice of theoretical courses or an extension of the research internship(s) by a maximum of 20 EC, provided that the total duration of the major research internship does not exceed 60 EC. The mentor may limit the choice in elective courses by the need to adapt the program to the present knowledge of the student.

Students can choose their electives from the list of core courses or electives of their research area, the core or elective courses of the other research area, the MSc courses offered by Life Science & Technology or in the Science Faculty of level 400 or higher, or level 400 courses from the BSc MST and LST programs provided that these were not part of the student's earlier studies. Students may also choose MSc courses of any Science Faculty in the Netherlands as elective courses.

Note: other electives have to be approved by the Board of Examiners before they can be included in the master curriculum

Specialisation specific components

Chemistry Research (Chem)

The research specialisation offers the student the opportunity to spend two full years on training in a research area to become an independent and creative scientist. The majority of the students with an MSc in Chemistry research will continue their career in a PhD position. Students in this specialisation have to prepare an essay and present the essay in their colloquium (6 EC).

Literature essay and colloquium guidelines

In the research specialisation the student selects a topic for the colloquium & (literature) essay topic in consultation with a colloquium supervisor. The colloquium supervisor is a member of the LIC staff but cannot be the student's mentor. The subject of the essay & colloquium is chosen within the field of Chemistry or Life Sciences but may not be directly related to the student's research project.

The colloquium & essay comprises two parts:

- A written essay of 10-15 pages.
- A colloquium of 30 minutes, including 5 minutes of discussion.

The colloquium & essay should contain the following basic elements:

- Introduction and scope
- Review of the topic
- Conclusion and outlook

A committee of two staff members (NOT the mentor NOR the colloquium supervisor) grades the colloquium & essay. The student in consult with the colloquium supervisor composes the jury and invites the jury members to read the essay and to be present at the colloquium. Every MSc student is required to attend at least 10 colloquia by fellow MSc students of the various research themes during their MSc period. As proof of attendance, the chairman of the colloquium signs the student's colloquium attendance list. The student sends a digital copy of the colloquium attendance list to the study coordinator before the exit interview. For the colloquia a fixed number of opportunities are scheduled (which can be downloaded from our website). The colloquia are preferably held on Thursdays at 16:00 in the lecture room of the Cell Observatory. To schedule the colloquium the student is supported by the group administration to compose an announcement containing the title, abstract, time and place of the colloquium. The student is responsible to post the announcement on the MSc communication board and to send an electronic version to the study coordinator. Detailed instructions on the colloquium procedure and the colloquium attendance list can be found at the master education web site: <https://masters.lic.leidenuniv.nl/literature-essay-and-colloquium>

Chemistry & Science Based Business (SBB)

The specialisation Chemistry & Science Based Business (SBB) offers the opportunity to combine training in chemical research with education in business and entrepreneurship. It enables science students to understand the fundamentals of business management and innovation. The emphasis is on science-driven organisations and on establishing new business based on the outcomes of scientific research. The SBB program is geared towards pursuing future career opportunities, both in academia and in industry. The majority of the SBB-students have found employment in industry as consultant or in a managerial position. The specific SBB modules consist of SBB Fundamentals (15 EC) and the SBB internship (25 EC). The total amount of SBB program components is limited to 60 EC.

More information and registration instructions for Science-Based Business are available on the website www.sbb.leidenuniv.nl. **The SBB program starts twice a year in September and February.**

Chemistry & Education (EDU)

The education part of the MSc program Chemistry and Education is organised by the Leiden University Graduate School of Teaching (ICLON) and the program language is Dutch. The specific modules comprise courses in Didactics (10 EC), Professional Functioning (12 EC), Educational Research (8 EC) and School Training (30 EC). The program is designed to obtain the so-called "eerstegraads lesbevoegdheid" which qualifies for teaching Chemistry at all levels in Dutch high schools. Students who have already finished the minor Education in their BSc studies, need only 30 EC of the specific modules; the remaining 30 EC is then added to the Electives of the Chemistry program.

More information can be found on the website www.iclon.leidenuniv.nl. **The education program can only be started in September after completion of the Chemistry modules of the program.**

Chemistry & Science Communication and Society (SCS)

The MSc track in Communication offers students the opportunity to combine research training with programs in different aspects of science communication, such as journalism, new media, museology and information visualisation. The MSc specialisation Chemistry & Science Communication and Society is offered by lecturers in Science Communication & Society (SCS). This program is in Dutch.

The primary focus in this specialisation is on science communication in the Netherlands and students explore various aspects of professional science communication.

More information can be found on the SCS website

<http://science.leidenuniv.nl/index.php/scs/onderwijs> (in Dutch). **The communication program starts in September.**

National Graduate Schools

In the Leiden Institute of Chemistry state-of-the-art chemical research is done. The institute co-organizes two bachelor programs, Molecular Science & Technology and Life Science & Technology that cover Chemistry in the broadest sense and prepare for a career in Chemistry, Chemical Engineering or Life Science & Technology. The two master programs Chemistry and Life Science & Technology are centred around the core research of the institute. These master programs are organised in the Graduate School of the Faculty of Mathematics and Natural Sciences.

The LIC house eight research groups and participates also in four National Graduate Schools with eight other universities. These National Graduate Schools are designed for talented students aiming for a future PhD position. Talented students can apply for admission in one of these Graduate Schools (see information on the respective websites).

- **Sustainability: the Molecular Approach, HRSMC** (collaboration of research groups in the Leiden University with the VU University Amsterdam and University of Amsterdam, <http://www.hrsmc.nl/graduate-programme>).
- **Solar Fuel Catalysis, NIOK** (collaboration of research groups at Utrecht University, the Eindhoven University of Technology, Leiden University and the University of Twente, <http://www.niok.eu/en/solarfuels>).
- **Netherlands Research School of Chemical Biology, NRSCB** (collaboration of research groups in Leiden University, the University of Groningen, the Radboud University, Nijmegen and the Eindhoven University of Technology, <http://nrscb.nl>).
- **Netherlands Magnetic Resonance Research School, NMARRS** (collaboration of research groups in Leiden University, the Radboud University Nijmegen, Utrecht University, Eindhoven University of Technology, Wageningen University, <http://www.nmr-nl.org>).

Global overview of the program

You will organize your program according to the global scheme shown below in accordance with your mentor. Your program must comply with the “[OER](#)”, the program regulations.

Global overview of the Chemistry program by specialisation				
	Research	Education	Communication	Business
Research Internship	60	30	30	30
Core components	24	24	24	24
Electives**	30	6/36*	26	26
Specialisation specific components	6	60/30*	40	40
Total	120	120	120	120

* Students who have finished a minor Education of 30 EC in their BSc study (tweedegraads lesbevoegdheid), need only 30 EC in their MSc study to obtain the “eerstegraads lesbevoegdheid”. The elective options for these students comprise 36 EC.

** The electives are chosen in consultation with the mentor. A maximum of 20 EC can be used for extension of the research internship(s).

Lists of core courses and electives in the Chemistry program

Core courses in the Chemistry program[@]

	Lecturer	Code
Chemical Biology *CB*		
Modern Organic Chemistry	vd Marel	MOC
Biomolecular Structures	Ubbink/Pannu	BMS
Molecular biology	Noteborn	MB
Supramolecular chemistry	Kros	SUP
Advanced Medicinal Chemistry	Van der Stelt	AMC
Reactivity in Organic Chemistry	Filippov/Codée	ROC
Cell Biology [@]	Noteborn	CEB
Chemical Biology	Overkleeft	CB
Energy & Sustainability *ES*		
Modern Quantum Chemistry Spectroscopy[@]	Buda	MQC
	Hetterscheid	SP
Organometallic chemistry & homogeneous catalysis	Bouwman	MHC
Electrochemistry & Bioelectrochemistry	Koper	EBE
Photochemistry	Bonnet	PC
Quantum dynamics of chemical reactions (<i>1x per 2 jaar</i>)	Kroes	QRD
<i>Dynamics of molecule-surface reactions (2015-2016)</i>	Kroes	DST

@ Courses that were taken in the BSc programs cannot be taken again in the MSc program. Instead one of the other core courses can be taken.

CB Students in the research area Chemical Biology choose 4 courses out of 8, depending on their prior education and in consult with their mentor.

ES For students in the research area Energy & Sustainability the two courses given in bold face are mandatory, in addition they choose 2 courses out of 4, depending on their prior education and in consult with their mentor.

Elective courses of the Chemistry program

Area		Title	Lecturer	Level	EC	Code
CB	ES					
•		Biomaterials (2015-2016)	Kieltyka	500	6	BMAT
•		Chemical Immunology	Van Kasteren	500	6	CHI
•		Cyttron II lectures	Abrahams	500	4	CL
•		Drug Discovery	Van Boeckel/ van der Stelt	500	4	DD
•		Metals in Life	Bonnet	500	6	MAL
•		Molecules of Life	van der Marel, Filippov, Codee	500	6	MOL
•		Synthetic Organic Chemistry [@]	vd Marel	400	6	SOC
•	•	Scientific Methodology	Gijsbers, Ubbink	400	4	SCM
•	•	Introduction Molecular Modelling	Fraaije	400	6	INM
•	•	Advanced Molecular Modelling	Fraaije	500	6	AMM2
•	•	BioNanoTechnology (2015-2016)	Schneider	500	6	BNT
	•	Chemistry & physics of solids	Fu	500	6	CPS
	•	Colloids & interfaces	Blokhuis	500	6	CIS
	•	Materials for sustainability (2015-2016)	Purchase			MFS
	•	Photosynthesis & Bioenergy	Pandit	500	3	PBE
	•	Scientific computing and programming	Somers	500	9	SC
	•	Solid state NMR	De Groot	500	6	SNMR
	•	Surface Science	Juurlink/Groot	500	6	SUS
	•	Theory of Spectroscopy and molecular properties	Buda/Somers	500	6	TSMP

@ BSc courses (level 400) may be included in a master program provided that this course was not part of the BSc program.

Short intensive week courses

The regular courses are scheduled in four periods of 7 weeks, and are concluded with two weeks of exams. The four periods in the academic year are separated with 'free weeks'. In these 'free weeks' (see schedules from page 18 onwards) short specialised courses will be offered. These courses may comprise lectures in combination with practical work, tasks or demonstrations, or may be courses offered by one of the National Graduate Schools. The courses that are offered may change from one year to another. The various courses that will be offered in a specific week will be announced separately via the web site

<https://masters.lic.leidenuniv.nl>.

Literature study

Students are also allowed to do a literature study. This is an individual course that is directly related to a research topic in one of the LIC research groups. Students can put forward a request to a research group leader and discuss the precise subject of the literature study. The research group leader decides who will become the supervisor of the course and may appoint one of his co-workers (staff, post-doc, PhD-student) to be the supervisor. Literature studies are not scheduled and may be requested all year round.

A literature study may be carried out on two different levels:

- A broadened literature study on a reviewed subject, level 500, 3-6 EC
- An in depth literature study on a novel subject in primary literature which has not yet been reviewed, level 600, 3-6 EC

When more students want to do a literature study about the same topic, the appointed supervisor may decide to change the course into a regular course (i.e. lectures or work group). The lecturer will decide the way in which the course is examined. Several forms of examination are possible: written report, written examination, oral examination, etc. The supervisor will determine the scope of the course and the amount EC before the start of the course. Students are also allowed to suggest their own topic. NB: an individual literature study in the form of a written report is not equivalent to the report of your research project!

Other eligible courses in the MSc Chemistry program

Electives are often announced on the master program web pages, Blackboard or in the University newspaper 'Mare' under 'Mededelingen FWN' (announcements of the Faculty of Science).

In addition to the courses described above students may also choose MSc courses from the MSc LST, the BSc LST and BSc MST. Details about these courses can be found on the website <https://masters.lic.leidenuniv.nl/courses> where we also recommend other courses in Leiden and Delft.

Students may also choose courses from MSc programs in all Dutch Science Faculties. It may be necessary to enrol as an external student at the university that organizes the chosen course. For more information contact the study coordinator.

An overview of all Dutch master programs in Chemistry and Chemical Engineering is presented on: www.universitairemasters.nl.

Optional courses may also be taken from the educational program of one of the national research schools (HRSMC, NIOK, NRSCB, NMARRS, see page 14). These Graduate Schools offer a number of inter-university courses and schools on yearly varying subjects.

Schedule and Timetable

The schedule is maintained on-line on our web site and consists of two parts: the timetable and the location of the lectures. The lectures are booked in the “ZRS” system and in the Cell Observatory agenda.

The most actual schedule can be found here: <https://masters.lic.leidenuniv.nl/download-schedule>

The locations can be found at: <http://zrs.leidenuniv.nl/ul/start.php>

Lecture hours

1st & 2nd Class 9:00 – 11:00

3rd & 4th Class 11:00 – 13:00

5th & 6th Class 13:30 – 15:30

7th & 8th Class 15:30 – 17:30

The most up to date schedule for the rooms will be available on the website of the program and on the large screen at the main entrance of the Gorlaeus Laboratories.

Course schedule – period 1

Course schedule – period 2

Course schedule – period 3

Course schedule – period 4

Lecturers and mentors

Links to important contacts

Description of the research topics and mentors can be found on the educational website (<https://masters.lic.leidenuniv.nl/internships>) and the institute website (<http://lic.leidenuniv.nl>). The contact details of the groups can be found here <https://masters.lic.leidenuniv.nl/internships/contact-details-research-groups>

List of LIC lecturers and mentors (■)

		phone	e-mail
■	Prof.dr. J.P. Abrahams	4213	abrahams@chem.leidenuniv.nl
	Dr. C.M.P. Backendorf	4409	backendo@chem.leidenuniv.nl
	Dr. R.J.B.H.N. van den Berg	4768	r.j.vdberg@chem.leidenuniv.nl
	Dr. E.M. Blokhuis	4542	e.blokhuis@chem.leidenuniv.nl
	Prof.dr. C.A.A. van Boeckel	3489	boeckelcaavan@chem.leidenuniv.nl
■	Dr. S. Bonnet	4260	bonnet@chem.leidenuniv.nl
■	Prof.dr. E. Bouwman	4550	bouwman@chem.leidenuniv.nl
	Dr. F. Buda	5723	f.buda@chem.leidenuniv.nl
	Prof.dr. J. Brouwer	4755	brouwer@chem.leidenuniv.nl
■	Dr. J. Codée	4280	jcodee@chem.leidenuniv.nl
	Dr. D.V. Filippov	4768	filippov@chem.leidenuniv.nl
	Dr B.I. Florea	4362	b.florea@chem.leidenuniv.nl
	Prof.dr. J.G.E.M. Fraaije	4243	j.fraaije@chem.leidenuniv.nl
	Dr. W.T. Fu	4215	w.fu@chem.leidenuniv.nl
	Dr. N. Goosen	4773	n.goosen@chem.leidenuniv.nl
■	Prof.dr. H.J.M. de Groot	4539	h.groot@chem.leidenuniv.nl
■	Dr. D.G.H. Hetterscheid	4545	d.g.h.hetterscheid@chem.leidenuniv.nl
■	Dr. L.B.F. Juurlink	4221	l.juurlink@chem.leidenuniv.nl
■	Dr. S.I. van Kasteren	4276	s.i.van.kasteren@chem.leidenuniv.nl
■	Dr. R.E. Kieltyka	4441	r.e.kieltyka@chem.leidenuniv.nl
■	Prof.dr. M.T.M. Koper	4250	m.koper@chem.leidenuniv.nl

■	Prof.dr. G.J. Kroes	4396	g.j.kroes@chem.leidenuniv.nl
■	Dr. A. Kros	4234	a.kros@chem.leidenuniv.nl
	Dr. M.E. Kuil	4416	m.kuil@chem.leidenuniv.nl
■	Prof.dr. G.A. van der Marel	4280	marel_g@chem.leidenuniv.nl
	Prof.dr. M.H.M. Noteborn	4544	m.noteborn@chem.leidenuniv.nl
	Dr. R.R.C.L. Olsthoorn	4586	olsthoor@chem.leidenuniv.nl
	Dr. Ing. M. Overhand	4483	overhand@chem.leidenuniv.nl
■	Prof.dr. H.S. Overkleeft	4342	h.s.overkleeft@chem.leidenuniv.nl
■	Dr. A. Pandit	4198	a.pandit@chem.leidenuniv.nl
■	Dr. N.S. Pannu	4414	raj@chem.leidenuniv.nl
■	Dr. G.F. Schneider	4770	g.f.schneider@chem.leidenuniv.nl
	Dr. G.J.A. Sevink	4344	a.sevink@chem.leidenuniv.nl
	Dr. M.F. Somers	4437	m.somers@chem.leidenuniv.nl
■	Dr. M. v.d. Stelt	4768	m.van.der.stelt@chem.leidenuniv.nl
■	Prof.dr. M. Ubbink	4628	m.ubbink@chem.leidenuniv.nl

Important Committees and Boards in the organisation

Board of Admission

The Board of Admission is an independent body judging the qualifications of students who want to start a master program and decides on their admission. The chair of the Board of Admission seeks advice with the senior staff when needed.

Educational Committee

The master program is monitored by an Educational Committee comprising of members of the teaching staff as well as elected student representatives from the MSc Chemistry, MSc Life Sciences and a MSc student from the Science Faculty representing the Science Based Business specialization. The study association Chemisch Dispuut Leiden and LIFE each have a student representative in the Educational Committee. The Educational committee is a joint committee of the two master programs organized by the LIC, Chemistry and LST. It also acts an advisory board for the master specialisation Science Based Business organized by the Faculty of Science.

In the Educational Committee all educational matters that concern students and staff can be discussed. The program directors and the chairs of the Board of Examiners are invited for each meeting of the Committee. The study coordinator is present at the meetings and is secretary of this Committee.

Board of Examiners

The Board of Examiners is the most important board in the program as they are entitled to approve your graduation, assign the right to grade courses and the right to supervise internships to the lecturers. Moreover, the most important task of the Board of Examiners is to guard the level of the academic program.

The Board of Examiners have to approve of changes in student's individual program based on the OER (see page **Error! Bookmark not defined.**) and may permit students to execute part of their program at other institutes. The Board of examiners composes the Rules and Regulations, a document that contains additional details on examination procedures in the program.

The board of examiners validates the graded research internship and needs access to the following documents for each internship:

- The internship agreement
- The signed and completed internship evaluation form
- A pdf version of the graded version of the final thesis (as a single file)
- A report of the jury of the Thesis Talk.

Students may contact the Board of Examiners via the study coordinator or in urgent cases directly by an e-mail to the Chairman.

Examinations and re-examinations

General rules

Students must sign-up for all exams using the uSis system. On the website of the Graduate School all course ID and class numbers can be found. If a student fails to pass an exam they are given the opportunity to participate in a re-examination. As the re-examinations are not scheduled, the following procedure is used to set the date of the re-examination:

1. Students who want to take part in a re-examination should contact the teacher as soon as the results are available.
2. The teacher composes a list of students who want to take part in the re-examination and determines a date for the re-examination and informs the students involved. The re-examination is scheduled preferably within 1 or 2 months after the first exam.
3. Time and place of the re-examination are communicated via ULCN mail to the students at least two weeks prior to the re-examination.

The lecturer submits a signed list of the results of examinations to the Graduate School Office. For each individual grade such as for a research project, internship or colloquium, the responsible lecturer will hand in a signed 'examination card' at the Graduate School Office. Students can check their examination results via uSis.

uSis and Frequently-asked-questions page

In uSis – <https://usis.leidenuniv.nl> – all student information such as addresses, programs and grades are registered. Students can monitor their own progress. Registration for examinations is obligatory and should be done via uSis. More information on the system and manuals can be found on <http://www.usishelp-en.leidenuniv.nl>

There is a frequently-asked-questions page in English available:

<http://media.leidenuniv.nl/legacy/usis-faq-en.pdf>

The faculty has a local contact for uSis specific questions: usis-fwn@edufwn.leidenuniv.nl.

Graduation and Exit

After the student has completed the 120 EC required for the MSc degree, the student contacts the study coordinator to draw a final program for approval by the board of examiners. At least six weeks before the desired graduation date the student should hand in the following documents at the Graduate School Office (HB-206):

- Curriculum of the fulfilled program, signed for approval by the mentor (a standard program) or the board of examiners (a non-standard program); this is a printout of your final master plan.
- A copy of the front page of the final written report of each research project.
- A copy of the front page of your colloquium (Research Specialisation) or the title of your specialisation internship.

The Graduate School Office will check the registration of all exam results. The student will be informed about the exact time and place where the formal part of the exam takes place (including a public presentation) as well as of the graduation ceremony where the student will receive the official documents.

Graduation dates 2014-2015

The graduation ceremonies of the MSc Chemistry and MSc Life Science & Technology always take place on a Tuesday. The following dates are available for the academic year 2014-2015:

16 September 2014*	20 January 2015
21 October 2014	17 February 2015
18 November 2014	17 March 2015
16 December 2014	21 April 2015
	19 May 2015
	16 June 2015
	22 September 2015**

* Available only for students who have finalized all their subjects before August 22, 2014.

** Available only for students who have finalized all their subjects before August 21, 2015.

Note that you have to submit your formal application for graduation at least six weeks before the desired graduation date at the “Educatief Centrum”, HB-206 and notify the study coordinator to arrange for an exit interview. In this exit interview with the study coordinator the student’s opinion and evaluation on the program are registered.

Studying abroad during your Leiden MSc Program

Students who are enrolled in one of the Leiden University MSc-programs can choose to spend some time abroad. It is the policy of the University to stimulate this, in order to broaden the students' horizon and improve their academic and language skills. Especially students who are enrolled in a 2-year (research) master program are advised to spend some time abroad.

Leiden has many bilateral exchange and cooperation agreements with universities all over the world, including many that belong to the top. First of all, Leiden University participates in the European Union's Erasmus program. This program offers many possibilities to follow courses or to do a research training project at one of the universities in the European Union, please see:

http://science.leidenuniv.nl/index.php/faculteit/onderwijs/studeren_in_buitenland/contracten

Beside this, there are many exchange agreements with universities outside of Europe such as the United States, Canada, Australia, Japan, South Africa and Korea. Students can also ask their academic staff members to recommend an international institute. A list of the non-European partner universities can be found at www.buitenland.leidenuniv.nl (in Dutch; choose "Uitwisselingsprogramma's buiten Europa").

Conditions

Students who want to spend some time abroad have to meet certain conditions first: your Board of Examiners has to approve the study program you intend to follow. Furthermore, you must have the right academic qualifications and language skills for the intended program. You can study abroad one semester or a full academic year. Students of the Faculty of Science should always contact Ms. Gloria Schildwacht for information, registration, selection, introduction to host university, safety regulations, scholarships, etc.

Scholarships and tuition fee

There are several scholarships for outgoing students, such as the Erasmus scholarship if you stay in Europe and the Lustra scholarship if you go outside of Europe. Students enrolled in a 2-year (research) master program can apply for the Outbound Study Grant. Selected students who go abroad to an exchange partner institute don't have to pay tuition fee to the guest university, because they are already enrolled at Leiden University.

Contact and Information

Ms. Gloria Schildwacht,
International Office of the Faculty of Science
Gorlaeus Laboratories, room 2.05
Einsteinweg 55
2333 CC Leiden
Phone: 071-527 57 83
Email: schildwacht@edufwn.leidenuniv.nl

Study associations: CDL & LIFE

Chemistry Study Association CDL

The 'Chemisch Dispuut Leiden' (CDL) has been the study association for Chemistry students at Leiden University since May 20th 1926. Since 2006, CDL also represents students from the bachelor study Molecular Science & Technology.

The CDL has an annual book market where we offer study books for a reduced price. Furthermore, we offer exams from previous years on our website to give our members an idea of what they can expect from examinations still to come. We provide the opportunity to get an idea about career prospects by organising excursions and lectures, about career opportunities or research subjects.

Besides these study-related activities the CDL also likes to create a positive atmosphere among the Chemistry students. In order to do this we organize activities such as: weekly drinks in the Science Club, laser gaming, parties and other fun activities. Together with the other study associations of the Faculty of Science we organize the annual 'Bètagala' (a ball for all students of our Faculty) and the Science Career Event, a great way to gain more information about a large number of companies. Together with the chemistry study associations from Amsterdam and Utrecht we organize the annual PAC symposium, a day full of interesting lectures from renowned researchers, including a great diner and party afterwards. We also issue our magazine called 'Chimica acta Lugduni' four times a year. Our office is located next to the main entrance of the Gorlaeus Laboratories. The board is present daily from 09.30 until 17.30 p.m. Our members often drop by for a cup of coffee or a cup of tea – both of which are free – or just to relax and have a chat.

We look forward to meeting you!

T: 071-5274502

E: Bestuur@chemischdispuutleiden.nl

W: www.chemischdispuutleiden.nl

Life Science & Technology Study Association LIFE

Study association LIFE was founded on the 9th of September 1999 for the interest of all the Life Science & Technology (LST) students. With 30 members, all first cohort LST students, the first committees were installed and activities were organised. After ten years LIFE has developed into a full-grown study association with over 500 members and is still expanding each year. The study association has a lot to offer its members under guidance of a fulltime board. With 17 installed committees, existing of approximately 50 active members, LIFE provides a supplement to the education program of LST by organising excursions to companies and social activities. Study association LIFE operates as an intermediary between companies and its members. Many contacts are already established over the years with companies in the Netherlands and abroad. Members are brought in contact with the corporate world and research in the field of life sciences and technology. To achieve this, activities are being organised in cooperation with companies. For example excursions, workshops, trainings and lectures are organised annually. LIFE also takes care of supplying study books and lab equipment for reduced prices throughout the year. The association ensures feedback on the education program of LST and ensures evaluation meetings for both bachelor and master students. Each year a Benelux study trip is organized for first year students and a European study trip for bachelor students. Once every two years an intercontinental study trip is organised for master students. The aims of these study trips

are to visit interesting companies and research groups abroad and to become familiar with other cultures. Each two months LIFE brings a journal with a report of all activities, interesting internships reports, and interviews concerning interesting functions within companies and research groups. Furthermore LIFE organises Life Science symposia and congresses within this interesting field of science. Regularly LIFE also organises activities with related study associations in the Netherlands. These are only a few of the services LIFE provides. An interesting and joyful year is being realized by LIFE for all LST students.

Contact information: <http://www.svlife.nl/contact>

Leiden University Address Information

- **MSc Program Chemistry**
Program coordinator Dr. M. E. Kuil
Gorlaeus Laboratories, Room HB-2.19
PO Box 9502
2300 RA Leiden
Phone +31-71-527 4416, E-mail m.kuil@chem.leidenuniv.nl
- **Graduate School Office (Educatief Centrum)**
Drs. C. M. van den Berge
Gorlaeus Laboratories, room HB-2.06
Einsteinweg 55
2333 CC Leiden
Phone: (071) 527 5762
Email: berge@edufwn.leidenuniv.nl
Opening hours: Monday to Thursday 10.00-15.00
- **International Office of the Faculty of Science**
Ms. G. Schildwacht
Gorlaeus Laboratories, room HB-2.05
Einsteinweg 55
2333 CC Leiden
Phone: (071) 527 57 83
Email: schildwacht@edufwn.leidenuniv.nl
- **ICT services / facilities**

ICT contact person	Dhr J. Detollenaere	
ICT Helpdesk Gorlaeus Laboratories	Monday/Friday 09:00-12:00 / 13:30-16:30	Room L103
Phone	071 - 527 8888	
Fax	071 - 527 6967	
Email	helpdesk@issc.leidenuniv.nl	
ICT for Students	http://issc.leiden.edu/ict-students	

- **Front Office Student Affairs / Plexus Student Centre**

The staff of the Front Office can provide information on the following subjects:

- Student registration / termination of registration, tuition fees
- Dutch student loans (studiefinanciering), completing forms
- Questions about applications for admission to Bachelor's and Master's programs & Study Abroad and exchange programs
- Illness and delayed study progress and the student financial support regulation 2000 (i.e. the Afstudeerfonds)

Contact form: <http://www.students.leiden.edu/form-front-office>

Kaiserstraat 25

2311 RA Leiden

Tel: 071-5278011

Visiting hours: Monday, Wednesday, Friday 09.00 – 17.00,

Tuesday and Thursday 09.00 – 21.00

- **PITSstop**

Study guides for other universities in the Netherlands, info on studying abroad, the employment market, application procedures and university regulations.

Plexus Student Centre, address: see above

Telephone: 071-5278025

The International Office holds a consultation session at the Meeting Point every Monday and Thursday from 13.00 – 17.00.

pitsstop@sea.leidenuniv.nl

<http://www.studenten.leidenuniv.nl/organisatie/pitsstop>

- **Student Career Service**

Study options and career advice, a study options test is available;

Workshops: Career orientation, CV and job application letters, Interviews and the application procedure, Psychological tests and assessment centres.

Plexus Student Centre, address: see above

Telephone: 071-5278011

There is an open consultation session: Tuesday and Friday 10.00 – 11.00

<http://students.leiden.edu/career>

- **Student Counsellors**

Advice on financial problems, problems with study progress, legal position, students who are involved in top-level sports, students with a handicap.

Plexus Student Centre, address: see above

Telephone: 071-527 8026 and 071-527 8011

Open consultation session: Monday to Friday 15.30 – 16.30

decanen@sea.leidenuniv.nl

<http://students.leiden.edu>

- **Student psychologists**
Advice on any problem, like family problems, concerns about social contacts, feelings of depression and relationship problems; courses and training sessions are available.
Plexus Student Centre, address: see above
Telephone: 071-527 8026
Open consultation sessions: Monday to Friday 11.00 – 12.00 Appointments possible:
Monday to Friday 09.00 – 17.00
psychologen@sea.leidenuniv.nl
<http://students.leiden.edu>
- **Ombudsperson**
For complaints about the behaviour of a staff member or an administrative body of Leiden University, one can apply to the ombudsperson. He or she is independent and handles complaints in strict confidentiality. Anonymous complaints cannot be dealt with.
Plexus Student Centre, address: see above
Telephone: 071-527 3657
ombudsfunctionaris@leidenuniv.nl
<http://students.leiden.edu>
- **(Sexual) Harassment**
For any cases of sexual harassment, bullying at work, aggression, violence and discrimination you may report.
Address: Occupational Health Department (GBGD),
Poortgebouw Zuid (3rd Floor),
Rijnsburgerweg 10,
2333 AA Leiden
Telephone: 071-527 8015

Other useful addresses

- **‘Dienst Uitvoering Onderwijs’ (formerly IBG)**
Regiokantoor DUO (Regional Office)
Koninginnegracht 12b/13, 2514 AA Den Haag,
tel. 050 599 77 55
Office hours: Monday through Friday from 9:00 to 17:00 o’clock, vragen@ocwduo.nl
www.ocwduo.nl
- **Stichting Leidse Studentenhuisvesting (SLS)**
(Foundation for Leiden’s Student Housing)
Visiting address: Doelengracht 4b, 2311 VM, Leiden
Postal address: Postbus 11275, 2301 EG, Leiden
Telephone +31 (0)71 516 1718
www.sls.nl

Safety Information Gorlaeus Laboratories - Leiden University

What to do in case of a fire, incident or other calamity?

Do Not Call 112!

but

Call the **Emergency Number 4222** (see the orange sticker on the phone or after office hours: 4444)

In case of fire

Activate the fire-alarm button

In case of a starting or small fire:

- Try to extinguish the fire use the handheld extinguisher or fire hose

In case of a large fire:

- Close doors and windows

- Go to the meeting point* (restaurant or car park)

and *follow instructions of the first-aid-personnel (BHV-ers)*

What to do if the alarm signal (“Slow Whoop”) sounds?

- Close windows, leave the room and close the door

- Follow the escape route (green pictogram plates)

In case of fire use the stairs and NEVER the elevator!

Go to the meeting point* (restaurant or car park);

DO NOT go home: All people who were present in the building have to be registered

DO NOT make the firemen look for you unnecessarily

Always follow the instructions of the firemen or the first-aid personnel (BHV-ers)

What to do when a dangerous situation is discovered?

Fill out a registration form digitally on <http://amd.leidenuniv.nl>

Or: Fill out the red paper form available at the reception

Or: Contact the safety officer of the faculty:

amd@science.leidenuniv.nl, 071 – 527 4333

* Meeting points are indicated in the evacuation plan (ontruimingsplan) of each building.

This plan is available at the reception or on

<http://www.science.leidenuniv.nl/index.php/faculteit/organisatie/amd>