Master's Degree Programme for Research Chemists

The Master's Degree Programme for Research Chemists is an international degree programme taught in English at the University of Eastern Finland. The programme is focused on researcher training in order to meet the ever-growing need for top quality researchers. The objective of the programme is to provide the students with solid theoretical and practical knowledge of chemistry and to promote their skills in working as independent and innovative researchers. The programme also serves as an excellent stepping stone for future PhD studies and it will bring the students into contact with the research community by integrating them into ongoing research projects.

Studying chemistry at the University of Eastern Finland

The most profound feature of the programme is the integration of research work into an essential part of the studies. The students will join a research group during their studies and carry out assigned research projects as active members of the group. During the research projects, the students will be familiarised with analytical problem-solving and working with up-to-date research methods and modern research infrastructure.

Master's theses and studies are linked to the research projects, creating a strong connection with businesses and the working life.

Aims of the higher university degree

The Master's Degree Programme for Research Chemists provides the student with understanding of the theoretical foundation of chemistry and gives tools to apply the skills in practical chemical problems. The students will acquire knowledge and skill to operate as an expert and developer in the fields of chemical sciences. The development of language and communication skills is an integral part of the programme. The education is based on scientific research methodology and professional practices in the chemistry.

Course structure and curriculum

The curriculum is planned to educate the students in theory and applications. There is freedom to specialize in specific fields of chemistry. Students will make their personal study plans during the first semester of their studies.

The extent of a degree is given in ECTS. The average input of 1600 working hours needed for studies of one academic year corresponds to 60 ECTS credits. One ECTS credit equals 27 hours of work

The Master's Degree Programme for Research Chemists is comprised of 120 ECTS, which means that the degree can be completed in two years. The studies include compulsory and elective modules that may vary according to the students' interests and major subjects. The major subject can be chosen from four principle categories: Inorganic Chemistry, Materials Chemistry, Organic Chemistry and Physical Chemistry. The contents of the programme are summarised in the following table.

ECTS = ECTS credit, A unit of measurement for studies, used to indicate the scope of a course. One ECTS credit equals 27 hours of work.
x = is offered
o = recommended to pass

	SCHEDULE AND CURRICULUM	ECTS	Aut	Spr	Summer	Aut	Spr	Tot
			2021	2022	2022	2022	2023	
	A. Core Courses		9			8		17
1131003	Orientation in Academic Studies for International Students	1	x					
3410360	Theoretical Inorganic Chemistry	4	x					
3410305	Theoretical Chemistry	4						
3410314	Theoretical Organic Chemistry	4						
3410310	Principles in Materials Science	4	x					
	B. Complementary Courses							12-16
3410302	Physical Methods in Inorganic Chemistry	4	x					
3410303	Organometallic Chemistry	4				x		
3410307	Molecular Modelling	4					x	
3410308	Surface Chemistry	4		x				
3410367	Catalysis	4		x				
3410315	Structure of Proteins	4	x					
3410316	Basic Principles of Mass Spectrometry	4				x		
3410365	Chemistry of Biofuels	4		x				
3410369	Polymers and Nanomaterials	4					x	
	Varying Courses given by visiting lecturers							
	C. Advanced Laboratory Techniques							9
3410333	Practical Molecular Modelling	3				x		
3410334	NMR Spectroscopy	3	x			x		
3410336	Characterization Methods for Polymers	3		x				
3410335	X-Ray Diffraction	3		x				
3410364	Biological Mass Spectrometry	3					x	
	D. Laboratory Exercises		4	9				13
3410361	Laboratory Safety and Practice	1	x					
3410322	Advanced Laboratory Course in Inorganic Chemistry	3	o	o				
3410324	Advanced Laboratory Course in Physical Chemistry	3	o	o				
3410325	Advanced Laboratory Course in Materials Chemistry	3	o	o				
3410327	Advanced Laboratory Course in Organic Chemistry	3	o	o				
3410332	E. Extended Laboratory Project	6-12			x			6-12
3410371	Practical training in Chemistry for Research Chemists (optional)	6						

3410370	F. Final examination in Chemistry	4-8			x	x		4-8
3410380	G. Master of Sciences Project and Thesis	40				x	x	40
3410354	Maturity test	0						
3410353	H. Master of Sciences Seminar	2					x	2
	I. Other Studies	7						7
	Total							**120**

Accurate schedules of courses are available in WebOodi/Peppi and Tuudo. It is highly recommended to check WebOodi/Peppi, Tuudo and uef.student emails regularly because of possible changes in schedules. Students in master's degree programme and incoming exchange students of chemistry take the chemistry exams in English language. More information about practicalities is available in Student handbook - KAMU, Study community of chemistry students and Yammer group of the programme.

A. Core courses

The compulsory Core Courses module (17 ECTS) is intended for all students regardless of the major subject. The compulsory Core Courses provide the foundations and basics before the more advanced studies, including elective courses in modules B-C and the Extended Laboratory Project that can be designed to match the students' interests. A lecture on study and research ethics is given in the first Autumn semester. The attendance is compulsory and a precondition to participation of exams and approval of study and research reports.

B. Complementary courses

The Complementary Courses include more specialised courses from different areas of chemistry. The students should choose the total of 12-16 ECTS of elective courses that best meet their interests. The electives are primarily organised in four different categories following the outlines of the major subjects. In addition, selected advanced level courses in physics, mathematics, biology, and computing organised by the other departments of the University of Eastern Finland may also be accepted as electives. Moreover, courses provided by the other Finnish universities may be considered as electives. In each case the acceptability of a course that is not mentioned in list the above will be decided by the supervising professor.

Varying courses on different areas of chemistry will also be offered. These courses will be taught by visiting lecturers.

C. Advanced laboratory techniques

The courses in module C provide introduction to the most important analytical tools and techniques.

D. Laboratory exercises

The students should pass the total of 13 ECTS of Laboratory Exercises. The aim is to familiarise the students with laboratory work. These exercises serve as an introduction to good laboratory practice and safety. The skills obtained during these exercises will be exploited during the research projects. It is compulsory to know safety and laboratory rules in laboratories. Every student must pass Laboratory Safety and Practice course before participating in other laboratory courses.

E. Extended laboratory project

The student will join a research group and work in a project. The results and conclusions will be presented in a report and a seminar the following fall. Half of the Extended laboratory project can be replaced with optional course Practical training in Chemistry for Research Chemists. The work tasks of practical training must correspond with the objectives for the practical training stated in the course description. The place of practical training must be approved by the head of the department. The details of the practical training should be agreed with the employer and an employment contract concluded before the practical training starts. Student writes a report about the practical training. The length of training is 1-1,5 months.

F. Final Examination

Final examination (4-8 ECTS) allows the students to gain a deeper insight into the topic of their choice. The Final examination will primarily be carried out as a book examination. The topics can be chosen to meet the students' interests. In each case the acceptability of a topic will be decided by the supervising professor. The goal is to encourage the students to search literature for up-to-date knowledge and techniques on their research area.

G. Master of science project and thesis

The Master's Thesis Project will conclude the Master's Degree Studies in Research Chemistry. The project will give the students an opportunity to make use of the theoretical and practical knowledge gained during the preceding courses and get further knowledge and further practical experience of research work in the area of their interest. The purpose of the Master's Thesis Project is to give the students an opportunity to apply the knowledge they have acquired during their studies to a larger-scale project. The students will be working in a research group during the Master's Thesis Project.

In the Master's thesis the students are expected to summarise their findings and present arguments and supporting hypotheses in a scientific manner. Thesis includes the Maturity test, which is the abstract of the thesis.

H. Master of science seminar

In the Master's seminar students will present their results in a public presentation. The students are also expected to be able to defend their results, views and arguments stated in the thesis.

I. Other studies

The students can choose studies (7 ECTS) from all courses offered in English by the department of Chemistry or different faculties of UEF according to student's interests and personal study plan. The Finnish language courses offered by the Language Centre, 8031003 University study skills (1 ECTS) or 8031004 University Computing Skills (1 ECTS) organized by Student and Learning Services can also be included her