Universität Regensburg
Faculty of Chemistry and Pharmacy
http://www.chemie.uni-regensburg.de

Module Catalog
for the Master's Program
“Advanced Synthesis and Catalysis" (SynCat)
at Universität Regensburg

The master's program "Synthesis and Catalysis" at Universität Regensburg consists of the following modules:

ASC-M SYN	Basic Module „Synthesis“
ASC-M CAT	Basic Module “Catalysis”
ASC-M TEC	Basic Module “Techniques”
ASC-M ATEC	Advanced Module “Techniques (practical course)”
ASC-M RES-EX	External (International) Module “Research”
ASC-M CON	Concluding Module
ASC-M MAT	Master's Thesis Module

Abbreviations:

C: compulsory course
CE: compulsory elective course
L: lecture
S: seminar
LC: lab course
E: exercise

ASC-M SYN

1. Module title:	Basic Module "Synthesis"
2. Field / person in charge:	Chemistry / Prof. Dr. Arno Pfitzner
3. Module contents:	In the lectures and the seminar, the module participants learn advanced modern methods of inorganic and organic synthetic chemistry. In the customized laboratory course, theoretical knowledge will be practically applied.
4. Qualification objectives of the module / competencies to be acquired:	Students can apply their extensive knowledge of the modern method of synthesis to concrete problems of molecule synthesis and can name scientifically correct and innovative solutions.
5. Prerequisites for participation:	
a) Recommended knowledge:	Solid basic knowledge in inorganic and organic synthetic chemistry, and in important analytical and physical techniques.
b) Prerequisite courses:	None
6. Module can be used for:	M.Sc. in ASC
7. Module is offered:	Each semester
8. Module can be completed in:	2 semesters
9. Recommended semester of study:	1st and 2nd semester
10. Module workload / number of credit points:	Workload: Total number of hours: 480 Allocation: 1. Attendance: 225 hours 2. Independent study: 255 hours including exam preparation Credit points (CPs): 16

11. The module is successfully completed when the requirements below have been met.

12. Module components:

No.	C / CE	Type of course	Topic	Contact hours (CHs)	CP(s)	Deliverables
1	C	L	Organic Synthesis I (WS)	2	2	
2	C	L	Inorganic Molecular Chemistry (WS)	2	2	
3	CE	L	Biomolecules I (SS)	2	2	
4	CE	L	Biomolecules II (WS)	2	2	
5	CE	L	Solid State Materials (WS)	2	2	
6	CE	L	Inorganic Nanochemistry (SS)	2	2	
7	CE	L	Organic Synthesis II (SS)	2	2	
8	CE	L	Organic Synthesis III (SS)	2	2	
9	C	S	Synthesis (WS)	2	2	
10	C	LC	Synthesis (WS/SS)	6	6	

13. Module examination:

Competence / topic	Type of examination	Duration	Time	Weighting of module grade
Module examination covering the courses 12.1, 12.2 and 12.9 (topic: Synthetic chemistry problem solving)	Oral	30 min.		100%

14. Notes:

One examiner each from Inorganic Chemistry and Organic Chemistry will jointly conduct the oral module examination.
Examination periods are as follows:
Winter semester: September 1 – December 15 and February 1 – March 31
Summer semester: May 1 – May 31 and July 1 – July 31
Two compulsory elective courses have to be chosen. Other compulsory elective courses can be attended to during the whole Master program.
At the end of the course an individual discussion between lecturer and student participant is scheduled to ensure the learning success.

ASC-M CAT

1. Module title:	Basic Module "Catalysis"
2. Field / person in charge:	Chemistry / Prof. Dr. Oliver Reiser
3. Module contents:	In the lectures and the seminar, the module participants learn advanced modern methods of inorganic and organic catalysis. In the customized laboratory course, theoretical knowledge will be practically applied.
4. Qualification objectives of the module / competencies to be acquired:	Students can apply their extensive knowledge of the modern method of catalysis to concrete problems of molecule synthesis and can name scientifically correct and innovative solutions.
5. Prerequisites for participation:	
a) Recommended knowledge:	Solid basic knowledge in inorganic and organic chemistry, and in important analytical and physical techniques.
b) Prerequisite courses:	None
6. Module can be used for:	M.Sc. in ASC
7. Module is offered:	Each semester
8. Module can be completed in:	2 semesters
9. Recommended semester of study:	1st or 2nd semester
10. Module workload / number of credit points:	Workload: Total number of hours: 480 Allocation: 1. Attendance: 240 hours 2. Independent study: 240 hours including exam preparation Credit points (CPs): 16

11. The module is successfully completed when the requirements below have been met.

12. Module components:

No.	C / CE	Type of course	Topic	Contact hours (CHs)	CP(s)	Deliverables
1	C	L	Catalysis I (SS)	2	2	
2	C	L	Coordination Chemistry and Catalysis (WS)	2	2	
3	CE	L	Catalysis II (WS)	2	2	
4	CE	L	Catalysis III (WS)	2	2	
5	CE	L	Catalysis IV (WS)	2	2	
6	CE	L	Cluster Chemistry (SS)	2	2	
7	CE	S	Design of Proteins (SS)	2	2	
8	C	T	Synthesis (SS)	2	2	Conducting a tutorial in German or English in BSc Chemistry
9	C	LC	Catalysis (WS/SS)	6	6	

13. Module examination:

Competence / topic	Type of examination	Duration	Time	Weighting of module grade
Final module examination covering the courses listed in section 12 (topic: Catalysis problem solving)	Oral	30 min.		100%

14. Notes:

One examiner each from Inorganic Chemistry and Organic Chemistry will jointly conduct the oral module examination.
Examination periods are as follows:
Winter semester:
September 1 – December 15 and February 1 – March 31
Summer semester: May 1 – May 31 and July 1 – July 31
Two compulsory elective courses have to be chosen. Other compulsory elective courses can be attended to during the whole Master program.
At the end of the course an individual discussion between lecturer and student participant is scheduled to ensure the learning success.

ASC-M TEC

1. Module title:	Basic Module "Techniques"
2. Field / person in charge:	Chemistry / Prof. Dr. Ruth Gschwind
3. Module contents:	In the lectures, modern techniques for structure elucidation (NMR, RSA) and for reaction monitoring are taught. The participants will put together a written research plan on a given topic and present it in the seminar.
4. Qualification objectives of the module / competencies to be acquired:	Students can apply their extensive knowledge of the modern method of structure elucidation, reaction performance and reaction monitoring to specific synthesis problems, can name scientifically correct and innovative solutions and can plan and implement a specific research project on their own.
5. Prerequisites for participation:	
a) Recommended knowledge:	Good knowledge of modern methods of inorganic and organic synthesis chemistry; lectures and research laboratories of the modules ASC-M SYN and ASC-M CAT
b) Prerequisite courses:	
6. Module can be used for:	M.Sc. in ASC
7. Module is offered:	Each semester
8. Module can be completed in:	2 semesters
9. Recommended semester of study:	1st and 2nd semester
10. Module workload / number of credit points:	Workload: Total number of hours: 480 Allocation: 1. Attendance: 200 hours 2. Independent study: 280 hours including exam preparation Credit points (CPs): 16

11. The module is successfully completed when the requirements below have been met.

12. Module components:

No.	C / CE	Type of course	Topic	Contact hours (CHs)	CP(s)	Deliverables
1	C	L	Spectroscopy I (WS)	2	2	
2	C	L	Spectroscopy II (WS)	2	2	
3	CE	L	Physical Methods I (SS)	2	2	
4	CE	L	Physical Methods II (SS)	2	2	
5	CE	L	Physical Methods III (SS)	2	2	
6	CE	L	Synthesis Techniques (SS)	2	2	
7	C	S	Synthesis (SS)	6	6	
8	C	E	English for Special Purposes I (WS)	2	2	
9	C	E	English for Special Purposes II (SS)	2	2	

13. Module examination:

Competence / topic	Type of examination	Duration	Time	Weighting of module grade
Final module examination covering the courses listed in section 12 (topic: Structure elucidation problem solving)	Oral	30 min.		100 %

14. Notes:

One examiner each from Inorganic Chemistry and Organic Chemistry will jointly conduct the oral module examination.
Examination periods for the oral partial module exam are as follows:
Winter semester: September 1 – December 15 and February 1 – March 31
Summer semester: May 1 – May 31 and July 1 – July 31
One compulsory elective courses has to be chosen. Other compulsory elective courses can be attended to during the whole Master program.
At the end of the course an individual discussion between lecturer and student participant is scheduled to ensure the learning success.

ASC-M ATEC

1. Module title:	Advanced Module "Techniques (practical course)"
2. Field / person in charge:	Chemistry /, Prof. Dr. Axel Jacobi von Wangelin
3. Module contents:	The practical application of modern analysis methods is required in order to determine molecular structures and to evaluate reaction processes, which will be practiced in this module. The focus will be on spectroscopic techniques (NMR), X-ray structure analysis and mass spectrometry. Chromatographic procedures will be used to follow the reaction progress and to analyze products. Specific laboratory techniques to deal with highly reactive reagents, sensitive catalysts and specific reaction controls will be practiced.
4. Qualification objectives of the module / competencies to be acquired:	Students will be able to practically apply modern methods of structure elucidation and reaction control and monitoring to concrete problems of molecular synthesis and to recognize and eliminate sources of error.
5. Prerequisites for participation:	
a) Recommended knowledge:	Good theoretical knowledge of modern methods of structure elucidation of organic and inorganic molecules and of reaction monitoring from modules ASC-M-SYN, ASC-M-CAT and ASC-M-TEC
b) Prerequisite courses:	None
6. Module can be used for:	M.Sc. in ASC
7. Module is offered:	Each semester
8. Module can be completed in:	2 semesters
9. Recommended semester of study:	2nd and 3rd semester
10. Module workload / number of credit points:	Workload: Total number of hours: 360 Allocation: 1. Attendance: 160 hours 2. Independent study: 200 hours Credit points (CPs): 12

11. The module is successfully completed when the requirements below have been met.

12. Module components:

No.	C / CE	Type of course	Topic	Contact hours (CHs)	CP(s)	Deliverables
1	C	LC	Lab Course Analytics (SS)	2	2	
2	C	LC	Lab Course Structure determination (SS)	2	2	
3	C	LC	Lab Course Theoretical Chemistry (SS)	2	2	
4	C	LC	Lac Course Synthesis (WS)	6	6	report

13. Module examination:

Competence / topic	Type of examination	Duration	Time	Weighting of module grade
This module will not be graded.				

14. Notes:

ASC-M RES-EX

1. Module title:	External (International) Module "Research"
2. Field / person in charge:	Synthesis Chemistry / Prof. Burkhard König
3. Module contents:	In a customized research internship of about 2 months of duration, preferably outside of the Faculty of Chemistry and Pharmacy, the participants acquire practical research experience in an international context.
4. Qualification objectives of the module / competencies to be acquired:	The ability to achieve and document, in a limited time, scientifically sound results on a new topic and in a new research environment
5. Prerequisites for participation:	
a) Recommended knowledge:	Successful participation in lectures and research laboratories of the modules ASC-M-SYN and ASC-M-CAT
b) Prerequisite courses:	None
6. Module can be used for:	M.Sc. in ASC
7. Module is offered:	Each semester
8. Module can be completed in:	Two semesters
9. Recommended semester of study:	2nd and 3rd semester
10. Module workload / number of credit points:	Workload: Total number of hours: 360 Allocation: 1. Attendance: 200 hours 2. Independent study: 160 hours Credit points (CPs): 12

11. The module is successfully completed when the requirements below have been met.

12. Module components:

No.	C / CE	Type of course	Topic	Contact hours (CHs)	CP(s)	Deliverables
1	C	LC	Synthesis Chemistry (SS and WS)	12	12	Research report

13. Module examination:

Competence / topic	Type of examination	Duration	Time	Weighting of module grade
This module will not be graded.				

14. Notes:

ASC-M CON

1. Module title:	CONcluding Module
2. Field / person in charge:	Chemistry / Prof. Dr. Manfred Scheer
3. Module contents:	This module consists of a methods course in the scientific sub-discipline of the Master's thesis and of a scientific excursion. The methods course comprises advanced training in selected scientific methods of the sub-discipline of the Master's thesis and their practical, exemplary testing. The scientific excursion introduces students to applications of the subject of chemistry in selected, changing industrial chemical companies and non-university research institutes.
4. Qualification objectives of the module / competencies to be acquired:	The students will be able to use scientific methods in the sub-discipline of the Master's thesis in a way that is theoretically reflected and practically tested. They will have (with reservations) generalizable knowledge about industrial application contexts of chemistry and the job profiles of chemists working as specialists or managers in non-university institutions and companies.
5. Prerequisites for participation:	
a) Recommended knowledge:	Knowledge of chemistry from a completed Bachelor's program in chemistry or a related degree program Knowledge in the area of modules ASC-M SYN, ASC-M CAT, ASC-M TEC
b) Prerequisite courses:	None
6. Module can be used for:	M.Sc. in ASC, M.Sc. in Chemistry, MSc. in MedChem
7. Module is offered:	Each semester
8. Module can be completed in:	1 semester
9. Recommended semester of study:	3rd semester
10. Module workload / number of credit points:	Workload: Total number of hours: 450 Allocation: 1. Attendance: 225 hours 2. Independent study: 225 hours Credit points (CPs): 15

11. The module is successfully completed when the requirements below have been met.

12. Module components:

No.	C / CE	Type of course	Topic	Contact hours (CHs)	CP(s)	Deliverables
1	C	LC	Methods Course (WS)	10	10	(Certificate of participation)
2	R	S	Excursion (WS)	5	5	Certificate of participation

13. Module examination:

Competence / topic	Type of examination	Duration	Time	Weighting of module grade
UNIcert III certification exam (level C1), Englisch (Chemistry)	UNIcert examination regulation			0 %
This module will not be graded.				

14. Notes:

ASC-M MAT

1. Module title:	Master's Thesis Module
2. Field / person in charge:	Chemistry / Prof. Dr. Joachim Wegener
3. Module contents:	This module consists of working on the Master's thesis and of participating on a regular basis in the working group seminar offered by the Master's thesis advisor. In the Master's thesis, a question from chemistry or a related scientific discipline will be answered for the most part independently and by using scientific methods. Topic and methods will be be chosen in consultation with the advisor of the Master's thesis. In the working group seminar, current research from the context of the working group will be presented; the student will give at least one presentation on the results of the Master's thesis. The module provides training to independently write a scientific paper and to do independent research.
4. Qualification objectives of the module / competencies to be acquired:	Students are able to independently work on a scientific question from the field of chemistry or a related scientific discipline, i.e. to plan how to solve the question and carry out the plan. They have advanced knowledge in literature research and evaluation, in the design and evaluation of experiments, and in writing a scientific paper.
5. Prerequisites for participation:	
a) Recommended knowledge:	Completed modules ASC-M SYN, ASC-M CAT, ASC-M TEC, ASC-M ATEC
b) Prerequisite courses:	48 CPs
6. Module can be used for:	M.Sc. in ASC, M.Sc. in Chemistry, MSc. in MedChem
7. Module is offered:	Each semester
8. Module can be completed in:	2 semesters
9. Recommended semester of study:	3rd and 4th semester
10. Module workload / number of credit points:	Workload: Total number of hours: 990 Allocation: 1. Attendance: 480 hours 2. Independent study: 510 hours Credit points (CPs): 33

11. The module is successfully completed when the requirements below have been met.

12. Module components:

No.	C / CE	Type of course	Topic	Contact hours (CHs)	CP(s)	Deliverables
1	C	LC	Master's thesis	30	30	
2	C	S	Working group seminar	4	3	Presentations on current research projects

13. Module examination:

Competence / topic	Type of examination	Duration	Time	Weighting of module grade
Master's thesis	Written	6 months		100%

14. Notes: The grade of the Master's thesis is the mean value of the grades given in the two written evaluations. If the grades differ by more than one full grade, the examination board determines the grade after talking to the thesis evaluators.