**nawi.pruefref@uni-graz.at**
Prüfungsreferat der Naturwissenschaftlichen Fakultät
Karl-Franzens-Universität Graz

# Masterstudium Chemistry

Matrikel-Nr.

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Familienname, Vorname(n)

Kennzeichnung des Studiums

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*Auflagen:* Ja ☐ Nein ☐

| Lehrveranstaltung | Typ | SWS | Datum | Note | ECTS | Anmerkungen |
|---|---|---|---|---|---|---|
| **Compulsory Module A1: Synthesis** | | | | | **05** | |
| Organometallic Chemistry of the Main Group Elements | VO | 1,33 | | | 02 | A.1.1 |
| Advanced organic Chemistry | VO | 02 | | | 03 | A.1.2 |
| **Compulsory Module B1: Applied Analytics** | | | | | **04** | |
| Advanced Inorganic Analytical Chemistry | VO | 1,33 | | | 02 | B.1.1 |
| Advanced Organic Analytical Chemistry | VO | 1,33 | | | 02 | B.1.2 |
| **Compulsory Module C1: Catalysis** | | | | | **05** | |
| Biocatalysis | VO | 02 | | | 03 | C.1.1 |
| Transition Metal Chemistry: from Structure to Catalysis | VO | 1,33 | | | 02 | C.1.2 |
| **Compulsory Module D1: Chemistry in Life Science and Environment** | | | | | **04** | |
| Green Chemistry | VO | 1,33 | | | 02 | D.1.1 |
| Food Chemistry | VO | 1,33 | | | 02 | D.1.2 |
| **Compulsory Module E1: Structure and Properties of Condensed Matter** | | | | | **04** | |
| Concepts in Applied Physical Chemistry | VO | 1,33 | | | 02 | E.1.1 |
| Structure and Matter | VO | 1,33 | | | 02 | E.1.2 |
| **Compulsory Module F1: Modeling and Theory** | | | | | **04** | |
| Introduction to Computational Chemistry | VU | 1,33 | | | 02 | F.1.1 |
| Statistical Thermodynamics | VU | 1,33 | | | 02 | F.1.2 |

| Lehrveranstaltung | Typ | SWS | Datum | Note | ECTS | Anmerkungen |
|---|---|---|---|---|---|---|
| **Main Focus – Elective Modules A2-F2**<br>3 der Module A2-F2 sind zur Gänze zu wählen.<br>Choose three modules from A2-F2. | | | | | **13-15** | § 9 (1)<br>Wahlmodule |
| **Elective Module A2: Synthesis** | | | --- | --- | **05** | |
| Reaction Mechanism | VO | 02 | | | 03 | A.2.1 |
| Advanced Polymer Synthesis | VO | 1,33 | | | 02 | A.2.2 |
| **Elective Module B2: Applied Analytics** | | | --- | --- | **05** | |
| Analytical Strategy, Method Development and Data Interpretation 1 | VU | 1,33 | | | 02 | B.2.1 |
| Analytical Strategy, Method Development and Data Interpretation 2 | VU | 02 | | | 03 | B.2.2 |
| **Elective Module C2: Catalysis** | | | --- | --- | **05** | |
| Heterogenous Catalysis and Surface Chemistry | VO | 1,33 | | | 02 | C.2.1 |
| Applied Catalysis | VO | 02 | | | 03 | C.2.2 |
| **Elective Module D2: Chemistry in Life Science and Environment** | | | --- | --- | **05** | |
| Chemistry of Biobased Systems | VO | 02 | | | 03 | D.2.1 |
| Energy and Environmental Science | VO | 1,33 | | | 02 | D.2.2 |
| **Elective Module E2: Structure and Properties of Condensed Matter** | | | --- | --- | **04** | |
| Radiation Techniques and Materials | VO | 1,33 | | | 02 | E.2.1 |
| Characterization of Condensed Matter | VO | 1,33 | | | 02 | E.2.2 |
| **Elective Module F2: Modeling and Theory** | | | --- | --- | **04** | |
| Hartree-Fock Theory | VU | 1,33 | | | 02 | F.2.1 |
| Advanced Computational Chemistry | VU | 1,33 | | | 02 | F.2.2 |
| **Special Focus – Elective Modules A3-F3**<br>Aus den gewählten „Main Focus – Elective Modules“ A2-F2 sind **2 der nachfolgenden Module** A3-F3 zu je min. 8 ECTS zu wählen.<br>Regarding to the “Main Focues – Elective Modules” choose 2 of following Modules A3-F3 with min. 8 ECTS of each. | | | | | **16** | § 9 (2)<br>Wahlmodule |
| **Elective Module A3: Synthesis**<br>Dieses Modul muss absolviert werden, wenn Elective Module A2 gewählt wurde.<br>This module is to choose if you have passed Elective Module A2. | | | --- | --- | **08** | |
| Advanced Aspects in Synthetic Main Group Chemistry | VO | 1,33 | | | 02 | A.3.1 |
| Molecules and (Nano)Materials | VO | 1,33 | | | 02 | A.3.2 |
| Modern Polymerization Concepts for Functional Polymers | SE | 1,33 | | | 02 | A.3.3 |

| Lehrveranstaltung | Typ | SWS | Datum | Note | ECTS | Anmerkungen |
|---|---|---|---|---|---|---|
| Advanced Aspects of<br>Small Molecule Activation | VO | 1,33 | | | 02 | A.3.4 |
| Flow Chemistry and Continuous Processing | VO | 1,33 | | | 02 | A.3.5 |
| Advanced and Applied Glycoscience | VU | 1,33 | | | 02 | A.3.6 |
| Stereochemistry | VO | 1,33 | | | 02 | A.3.7 |
| Retrosynthesis | VO | 1,33 | | | 02 | A.3.8 |
| Electroorganic Synthesis | VO | 1,33 | | | 02 | A.3.9 |
| Synthetic Methods<br>and Synthesis of Complex Molecules | VO | 1,33 | | | 02 | A.3.10 |
| Photochemistry and Energy Conversion | VO | 1,33 | | | 02 | A.3.11 |
| **Elective Module B3: Applied Analytics**<br>Dieses Modul muss absolviert werden, wenn Elective Module B2 gewählt wurde.<br>This module is to choose if you have passed Elective Module B2. | | | --- | --- | **08** | |
| Multidimensional NMR Spectroscopy<br>in Liquid state | VO | 02 | | | 03 | B.3.1 |
| Advanced Aspects of Magnetic Resonance | VO | 1,33 | | | 02 | B.3.2 |
| Applied Mass Spectrometry<br>of Organic Compounds | VO | 1,33 | | | 02 | B.3.3 |
| Hyphenated and Multidimensional<br>Separation Methods | VU | 1,33 | | | 02 | B.3.4 |
| Elemental Mass Spectrometry and Imaging | SE | 1,33 | | | 02 | B.3.5 |
| Professional Skills in Analytical Chemistry | SE | 1,33 | | | 02 | B.3.6 |
| Chemo- and Biosensors | VO | 1,33 | | | 02 | B.3.7 |
| Speciation | SE | 1,33 | | | 02 | B.3.8 |
| Advanced Spectra Interpretation | SE | 1,33 | | | 02 | B.3.9 |
| Single Crystal Structure Determination | VU | 1,33 | | | 02 | B.3.10 |
| **Elective Module C3: Catalysis**<br>Dieses Modul muss absolviert werden, wenn Elective Module C2 gewählt wurde.<br>This module is to choose if you have passed Elective Module C2. | | | --- | --- | **08** | |
| Bioinorganic Chemistry | VO | 1,33 | | | 02 | C.3.1 |
| Electrochemical Reactions<br>and Electrocatalysis | VO | 1,33 | | | 02 | C.3.2 |
| Catalytic Aspects in Macromolecular Science | VO | 1,33 | | | 02 | C.3.3 |
| Photochemistry and Photocatalysis<br>in Organic Synthesis | VO | 1,33 | | | 02 | C.3.4 |
| Advanced Catalysis | VO | 02 | | | 03 | C.3.5 |

| Lehrveranstaltung | Typ | SWS | Datum | Note | ECTS | Anmerkungen |
|---|---|---|---|---|---|---|
| Catalysis with Renewable Resources | VU | 02 | | | 03 | C.3.6 |
| Asymmetric Catalysis | VO | 1,33 | | | 02 | C.3.7 |
| Mechanistic Elucidation of Catalytic Reactions | VO | 1,33 | | | 02 | C.3.8 |
| **Elective Module D3: Chemistry in Life Science and Environment** Dieses Modul muss absolviert werden, wenn Elective Module D2 gewählt wurde. This module is to choose if you have passed Elective Module D2. | | | --- | --- | **08** | |
| Molecular Physiology | VO | 1,33 | | | 02 | D.3.1 |
| Organic Chemistry of Metabolic Pathways | VO | 1,33 | | | 02 | D.3.2 |
| Chemical Biology and Drug Development | VO | 1,33 | | | 02 | D.3.3 |
| Medical Aspects in Glycoscience | VU | 1,33 | | | 02 | D.3.4 |
| Polymers in Life Science and Environment | VO | 1,33 | | | 02 | D.3.5 |
| Biomedical Analysis | VO | 1,33 | | | 02 | D.3.6 |
| Transformation and Shaping of Biobased Systems | VO | 1,33 | | | 02 | D.3.7 |
| Chemical Processing and Environment | VO | 1,33 | | | 02 | D.3.8 |
| Environmental Chemistry and Toxicology | SE | 1,33 | | | 02 | D.3.9 |
| Environmental Metallomics | SE | 1,33 | | | 02 | D.3.10 |
| **Elective Module E3: Structure and Properties of Condensed Matter** Dieses Modul muss absolviert werden, wenn Elective Module E2 gewählt wurde. This module is to choose if you have passed Elective Module E2. | | | --- | --- | **08** | |
| Solid State Electrochemistry | VO | 1,33 | | | 02 | E.3.1 |
| Self-Assembly and Nanomaterials | VO | 1,33 | | | 02 | E.3.2 |
| Transport Phenomena and Charge Delocalization in Condensed Matter | VO | 02 | | | 03 | E.3.3 |
| Batteries and Capacitors | VO | 1,33 | | | 02 | E.3.4 |
| Theory of Condensed Matter | VO | 1,33 | | | 02 | E.3.5 |
| Introduction to Modern Materials | VO | 02 | | | 03 | E.3.6 |
| Synchrotron Radiation | VO | 1,33 | | | 02 | E.3.7 |
| Surface Science | VO | 02 | | | 03 | E.3.8 |
| Current Topics in Condensed Matter | SE | 01 | | | 01 | E.3.9 |

| Lehrveranstaltung | Typ | SWS | Datum | Note | ECTS | Anmerkungen |
|---|---|---|---|---|---|---|
| **Elective Module F3: Modeling and Theory**<br>Dieses Modul muss absolviert werden, wenn Elective Module F2 gewählt wurde.<br>This module is to choose if you have passed Elective Module F2. | | | --- | --- | **08** | |
| Applications in Computational Chemistry | UE | 02 | | | 03 | F.3.1 |
| Concepts of Chemical Bonding | SE | 1,33 | | | 02 | F.3.2 |
| Density Functional Theory | VO | 1,33 | | | 02 | F.3.3 |
| Group Theory for Scientists | VU | 02 | | | 03 | F.3.4 |
| Intermolecular Forces in Hybrid Materials | VO | 1,33 | | | 02 | F.3.5 |
| Informatics 1 | VU | 04 | | | 04 | F.3.6 |
| Machine Learning for Data Analysis | VO | 1,33 | | | 02 | F.3.7 |
| Post-Hartree-Fock Methods | VO | 1,33 | | | 02 | F.3.8 |
| **Laboratory – Elective Modules A4-F4**<br>2 LU+SE aus den 3 gewählten “Elective Modules” A2-F2 sind zu absolvieren.<br>Pass 2 LU+SE of the 3 choosen “Elective Modules” A2-F2. | | | | | **10** | § 9 (3) Wahlmodul |
| **Elective Module A4: Synthesis** | | | --- | --- | --- | |
| Organometallic Chemistry and Nanoparticles | LU | 04 | | | 04 | A.4.1.1 |
| Organometallic Chemistry and Nanoparticles | SE | 01 | | | 01 | A.4.1.2 |
| Organic and Organometallic Synthesis | LU | 04 | | | 04 | A.4.2.1 |
| Organic and Organometallic Synthesis | SE | 01 | | | 01 | A.4.2.2 |
| Organic Chemistry - Synthesis | LU | 04 | | | 04 | A.4.3.1 |
| Organic Chemistry – Synthesis | SE | 01 | | | 01 | A.4.3.2 |
| **Elective Module B4: Applied Analytics** | | | --- | --- | --- | |
| Advanced Analytics for Food and Food Contact Material | LU | 04 | | | 04 | B.4.1.1 |
| Advanced Analytics for Food and Food Contact Material | SE | 01 | | | 01 | B.4.1.2 |
| Advanced Environmental and Pharmaceutical Analysis | LU | 04 | | | 04 | B.4.2.1 |
| Advanced Environmental and Pharmaceutical Analysis | SE | 01 | | | 01 | B.4.2.2 |
| **Elective Module C4: Catalysis** | | | --- | --- | --- | |
| Metal- and Biocatalysis | LU | 04 | | | 04 | C.4.1.1 |
| Metal- and Biocatalysis | SE | 01 | | | 01 | C.4.1.2 |

| Lehrveranstaltung | Typ | SWS | Datum | Note | ECTS | Anmerkungen |
|---|---|---|---|---|---|---|
| **Elective Module D4: Chemistry in Life Science and Environment** | | | --- | --- | --- | |
| Environment and Biobased Systems | LU | 04 | | | 04 | D.4.1.1 |
| Environment and Biobased Systems | SE | 01 | | | 01 | D.4.1.2 |
| Green Chemistry and Life Sciences | LU | 04 | | | 04 | D.4.2.1 |
| Green Chemistry and Life Sciences | SE | 01 | | | 01 | D.4.2.2 |
| **Elective Module E4: Structure and Properties of Condensed Matter** | | | --- | --- | --- | |
| Advanced methods for Condensed-phase Investigations | LU | 04 | | | 04 | E.4.1.1 |
| Advanced methods for Condensed-phase Investigations | SE | 01 | | | 01 | E.4.1.2 |
| Solids and Interfaces | LU | 04 | | | 04 | E.4.2.1 |
| Solids and Interfaces | SE | 01 | | | 01 | E.4.2.2 |
| **Elective Module F4: Modeling and Theory** | | | --- | --- | --- | |
| Computational Chemistry: Molecular Structures and Spectroscopy | LU | 04 | | | 04 | F.4.1.1 |
| Computational Chemistry: Molecular Structures and Spectroscopy | SE | 01 | | | 01 | F.4.1.2 |
| Computational Chemistry: Molecules, Solids and Interfaces | LU | 04 | | | 04 | F.4.2.1 |
| Computational Chemistry: Molecules, Solids and Interfaces | SE | 01 | | | 01 | F.4.2.2 |
| **Elective Module: Interdisciplinary** Frei zu wählen aus den Curricula der Masterstudien/Free to choose form: Chemistry, Technical Chemistry, Chemical and Pharm. Engineering, Advanced Materials Science, Biochemie und Molekulare Biomedizin; max. eine zusätzliche LU+SE (5 ECTS) aus A4-F4/max. 1 additional LU+SE (5 ECTS) out of A4-F4. | | | | | **14-16** | § 9 (4) Wahlmodul |
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| Lehrveranstaltung | Typ | SWS | Datum | Note | ECTS | Anmerkungen |
|---|---|---|---|---|---|---|
| **Master's Thesis Seminar** | | | | | **01** | |
| **Free Choice Subjects**<br>Evtl. Auflagen-LVen im Ausmaß von max. 5 ECTS dürfen für die Freien Wahlfächer verwendet werden. | | | | | **07** | $\mathbf{N}_{FWF}$ = 1:1<br>(VO = 1:1,5) |
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| **Master's Thesis** | | | | | **30** | |
| **Master's Examination** | | | | | **01** | |

Das Masterstudium Chemistry umfasst 4 Semester. Der Gesamtumfang beträgt 120 ECTS.

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ECTS-Zusammenfassung vom Prüfungsreferat der Naturwissenschaftlichen Fakultät auszufüllen.

| Module | Soll-ECTS | Tatsächliche ECTS |
|---|---|---|
| Compulsory Module A1-F1 | 26 | 26 |
| Main Focus – Elective Modules A2-F2 | 13-15 | |
| Special Focus – Elective Modules A3-F3 | 16 | 16 |
| Laboratory – Elective Modules A4-F4 | 10 | 10 |
| Elective Module Interdisciplinary | 14-16 | |
| Master's Thesis Seminar | 01 | 01 |
| Free Choice Subject | 07 | 07 |
| Master's Thesis | 30 | 30 |
| Master's Examination | 01 | 01 |
| | Summe | 120 |