

FORMAL REQUIREMENTS AND ADMINISTRATION OF DOCTORAL STUDIES

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PhD programme: **ANALYTICAL GEOCHEMIST/ANALYTICKÝ GEOCHEMIK (ANGE)**

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General requirements for all students in the programme (please see detailed requirements for the Individual Study Plan in the detailed table below):

Mandatory courses: *checked by Dean's Office*

XD100 or GD5x1	Ph.D. thesis / Příprava dizertační práce	<i>Enrolled every semester during entire studies, recommended 25 ECTS for semesters 1-4, 30 ECTS for semesters 5-8, 20 ECTS for semesters 9 +</i>
CDn01 or GD101; and XD107	Field seminar /Oborový seminář; Seminar of Ph.D. Chemistry studies /Seminář DSP Chemie	Obligatory seminars for 8 semesters (n = 1-8)
C7777	Handling chemical substances / Zacházení s chemickými látkami	<i>Enrolled every year of study, every autumn semester</i>
XD102 or GV001	Teaching Assistance / Pomoc při výuce	<i>150 hours total</i>
G0101	Occupational health and safety/ Školení BOZP a PO pro geology	<i>Enrolled every year of study, every autumn semester</i>
XD106 or GD611	Lecture in the foreign language /Odborná přednáška v cizím jazyce	<i>Minimum once during studies (recommended 0 ECTS)</i>
	Placement Abroad /Zahraniční pracovní pobyt	<i>Minimum 1 month stay, min. 1-time during studies (usually 5 ECTS/month), requirement given by law. Other forms of international cooperation must be approved by the Doctoral Board. Instructions for recognition of Placement Abroad: https://www.sci.muni.cz/en/students/go-abroad/recognition-of-stay-abroad (the recognition is done via IS application Internship and Stays, by creating record of the stay and request for recognition; the course is then registered by Dean's Office)</i>

Theoretical courses and all other requirements: *checked by the Head of Doctoral Board / Head of Doctoral Committee*

- a minimum of 4 courses completed with exams and 4 credited courses are required by the end of Semester 4

Requirements for theoretical state doctoral examination (SDE*):

The state doctoral examination is designed to verify the student's general knowledge in the field and acquaintance with scholarly methods of research. The student submits a treatise **“Short Thesis”** on his future dissertation (a text of 10 to 20 pages in English) one month before SDE. The examination has the form of a one hour interview between the doctoral student and the members of the committee. The committee announces the assessment of the examination obtained by secret voting immediately after the examination has been completed.

The subject areas for the SDE include:

- Trends in analytical chemistry
- Analytical methods in geochemistry
- Data processing and statistical analysis
- Environmental Geochemistry
- Mineralogy, petrology, geochemistry
- Methods used in the student's dissertation

General outline:

- **Semesters 1-4 (first 2 years of study)** - students work on their research project and fulfil other requirements (theoretical classes, preparing for State Doctoral Exam – SDE, teaching assistance)
- **Semesters 5 – 8:** SDE* (5th – 6th semester) and main focus on research (work on doctoral project and thesis, publications, presentations at conferences, etc.)

General requirements for all students in the programme (please see detailed requirements for the Individual Study Plan in the detailed table below):

From the offer of other subjects, the student selects in cooperation with the supervisor and assigns to the ISP. The division into:

- **subjects expanding theoretical knowledge and deepening knowledge of the wider scientific field – 4 subjects with an examination**
- **subjects deepening specialized knowledge of the field – 4 subjects with colloquium or credit**

is indicative and depends on the student's knowledge status at the entrance examination.

(Z nabídky dalších předmětů vybírá student ve spolupráci se školitelem a zařazuje do ISP. Rozdělení na:

- ***předměty rozšiřující teoretické vědomosti a prohlubující znalosti širšího vědního oboru – 4 předměty zakončené zkouškou***
- ***předměty prohlubující specializované znalosti oboru – 4 předměty zakončené kolokviem nebo zápočtem***

je indikativní a závisí na stavu znalostí studenta u přijímací zkoušky.)

Subjects expanding theoretical knowledge and deepening knowledge of the wider scientific field (Předměty rozšiřující teoretické vědomosti a prohlubující znalosti širšího vědního oboru)

C5060: Methods of chemical research (lecture) /Metody chemického výzkumu (přednáška)

C5150: Trends in analytical chemistry (lecture) /Trendy v analytické chemii (přednáška)

C7060: Trace analysis (lecture) /Stopová analýza (přednáška)

C6135: Statistical analysis of univariate data (lecture and exercise) /Analýza jednorozměrných dat (přednáška a cvičení)

C9070: Plasma spectrometry (lecture) /Hmotnostní a optická plazmová spektrometrie (přednáška)

C7021: Separation methods A (lecture) /Separační metody A (přednáška)

C7080: Lasers in analytical chemistry (lecture) /Lasery v analytické chemii (přednáška)

Graduates of the Master's degree in Geology can choose other subjects from the Chemistry catalogue (Absolventi magisterského studia Geologie si mohou vybrat další předměty z katalogu Chemie)

GE111: Earth evolution for analytical geochemists (lecture) /Vznik a vývoj Země pro analytické geochemiky (přednáška)

GE121: Geochemistry on the Earth surface for analytical geochemists (lecture) /Geochemie povrchu Země pro analytické geochemiky (přednáška)

GE131: Chemical methods in geology (lecture) /Chemické metody v geologii (přednáška)

GE141: Rock-forming minerals for analytical geochemists (lecture + exercise) /Horninotvorné minerály pro anal. geochemiky (přednáška + cvičení)

GE151: Fundamentals of petrography for analytical geochemists (lecture + exercise) /Základy petrografie pro anal. geochemiky (přednáška + cvičení)

GE211: Origin of mineral deposits for analytical geochemists (lecture) /Ložiskotvorné procesy pro analytické geochemiky (přednáška)

GE221: Analytical hydrogeochemistry (lecture) /Analytická hydrogeochemie (přednáška)

Subjects deepening specialized knowledge of the field (Předměty prohlubující odborné znalosti oboru)

C9067: Elemental trace analysis of geological materials by ICP-QMS – analysis of solutions and laser ablation (lecture) /Stopová prvková analýza geologických materiálů ICP-QMS – analýza roztoků a laserová ablace (přednáška)

C9051: ICP-HRMS in the analysis of geological materials (lecture) /ICP-HRMS v analýze geologických materiálů (přednáška)

C9053: Determination of elemental contents in geological materials by ICP-OES (lecture) /Stanovení obsahů prvků v geologických materiálech ICP-OES (přednáška)

C9054: Analysis of geological samples using ICP-OES (exercise) /Analýza geologických vzorků pomocí ICP-OES (cvičení)

C9055: Analysis of geological materials by X-ray fluorescence spectrometry, XRF (lecture + exercise) /Analýza geologických materiálů rentgenfluorescenční spektrometrií XRF (přednáška + cvičení)

C9057: Preparation of geological samples for analysis (lecture + cvičení)

GE231: Environmental and geological sampling (lecture + exercise) /Environmentální a geologické vzorkování (přednáška + cvičení)

GE241: Electron microscopy and microanalysis for geosciences (lecture) /Základy elektronové mikroskopie a mikroanalýzy pro geovědní obory (přednáška)

GE251: Exercises of Electron microscopy and microanalysis for geosciences (exercise) /Praktické cvičení z elektronové mikroskopie a mikroanalýzy pro geovědní obory (cvičení)

GE261: Geochemical data processing /Zpracování geochemických dat

Graduates of the Master's degree in Chemistry can choose other subjects in the Geology catalogue. (Absolventi magisterského studia Chemie si mohou vybrat další předměty z katalogu Geologie)

Individual study plan elements		Milestones and their check			
Areas A - E	Activities 1 - 9	Enrolment to studies Before semester 1	Milestone 1 End of Semester 1	Milestone 2 End of Semester 4	Milestone 3 End of Semester 8
<p>A) Scientific research competences</p> <p>Research and development activities (ca. 70 % of workload)</p>	<p>1. Preparation of dissertation work</p> <p>It includes scientific research on the topic of the dissertation thesis including compilation of the review on the current state of the topic, as well as continuous acquisition of practical experience in methodology during fieldwork, in laboratories, or specialized classrooms (50%)</p>	<p>Define framework topic of your PhD project with your supervisor for enrolment.</p> <p>CHECK: Dean's office [enrolment]</p> <p>Enrol and complete XD100 for each semester (25 ECTS for semesters 1-4, 30 ECTS for semesters 5-8, 20 ECTS for semesters 9+)</p> <p>Enrol and complete Handling chemical substances (C7777) course in each Fall semester.</p> <p>Enrol and complete Occupational health and safety (G0101) course in each Fall semester</p> <p>CHECK: Dean's office</p>	<p>Submit "Individual Study Plan (ISP)" for your PhD work to the Doctoral Board - a detailed research program and study plan of the whole study.</p> <p>CHECK: Programme Board [Submitted Individual Study Plan]</p> <p>then</p> <p>Dean's office [Submitted Individual Study Plan]</p>	<p>Prepare "Short Thesis" (10- 20 pages of text containing literature review by the end of the 4th semester. This part may later be used as Introduction-background to the final PhD Thesis.</p> <p>Submit the "Short Thesis" to the Programme Board</p> <p>CHECK: Programme Board [State Doctoral Examination (SDE) assessment]</p>	<p>Submit the "Short Thesis" to the State Doctoral Examination (SDE) committee one month before the SDE.</p> <p>CHECK: Examination committee [SDE assessment]</p> <p>Pass SDE in the 5th or at the latest in the 6th semester.</p> <p>Submit PhD thesis, see Programme Board instructions, SCI MUNI format requirements</p> <p>CHECK: Programme board, Dean's office</p> <p>The preferred form of dissertation is a TREATISE.</p> <p>Allowed dissertation form is a commented collection of publications.</p> <p>Also submit:</p> <ol style="list-style-type: none"> 1. Thesis Summary (CZ and ENG) on motivations and results. 2. Curriculum vitae of yours. 3. List of publications and conference presentations . <p>CHECK: Programme Board, Dean's office</p>

	<p>2. Publication activity and writing of dissertation thesis text</p> <p>Dissertation thesis should be based on published or accepted papers demonstrating quality and independence of the student's research work (15 %)</p>	<p>No formal check needed</p>	<p>No formal check needed</p>	<p>No formal check needed Student's publication(s) may be included in the "Short Thesis" for SDE (if relevant).</p>	<p>The admission of the dissertation thesis for the defense is based on fulfilling of the following criteria:</p> <p>1. The student is an author of 2 publications in journals ranked in quartiles Q1 or Q2 in a particular category according to Web of Science. (WoS). If the publication is ranked in more than one category, the best rank is considered. The student is the 1st author of at least 1 of these publications. (Co-/authorship of a submitted or granted international patent application may be accepted as authorship of one of these publications, but only based on specific approval by the Programme Board).</p> <p>OR</p> <p>2. The student is the 1st author of 1 publication in journal ranked in the 1st decile in a particular category of the WoS with an exception of review articles (this is allowed only based on approval by the Doctoral Board).</p> <p>One paper should be published by the end of the 6th semester CHECK: Programme board [Thesis].</p>
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	<p>3. Presentation of results on scientific seminars, symposia, conferences etc., including preparation of talks and/or poster presentations (5 %)</p>	<p>No formal check needed</p>	<p>No formal check needed</p>	<p>No formal check needed</p> <p>A list of presentations may be included in the “Short Thesis” for SDE (if relevant).</p>	<p>A student must present one oral presentation at an international seminar or a conference in English to obtain credits for XD106.</p> <p>Credits are awarded by supervisors or by a person designated in advance by the Doctoral Board.</p> <p>CHECK: Dean’s office [XD106]</p>
<p>B) Specialized courses and theoretical preparation (20%)</p>	<p>4. Theoretical courses, laboratory exercises, and preparation to the state doctoral exam – SDE (15%)</p>	<p>Select courses according to identified student’s knowledge gaps and required topics for SDE.</p> <p>Plan corresponding courses, trainings for the first two years. Consider courses at MUNI or outside. Minimum 4 courses completed with an exam and 4 credited courses are required.</p> <p>Selection can be changed/updated for each semester.</p> <p>CHECK: Supervisor</p>	<p>No formal check needed</p>	<p>Successfully pass minimum 4 courses completed with an exam and 4 credited courses.</p> <p>CHECK: Dean’s office [IS.MUNI]</p> <p>Courses completed abroad are approved by the Programme Board.</p> <p>CHECK: Dean’s office [IS.MUNI]</p> <p>Have all other requirements fulfilled (see in this column) and submit the application to theoretical SDE.</p> <p>The Doctoral Board organizes SDE during Semester 5-6.</p>	<p>No formal check needed, requirements already fulfilled</p>

	<p>5. Doctoral seminars (5%)</p>	<p>Enrol CDn01, n = 1-8 (Attendance is compulsory during the actual length of study). Seminar is not compulsory in the combined form of studies.</p> <p>Enrol XD107 (Attendance is compulsory during the actual length of study). This course is conducted as a doctoral student conference at the end of each semester. Students present 2 posters and a lecture on their results of dissertation work. This seminar is compulsory in the combined form of studies during the standard length of studies, the lecture before dissertation defence is compulsory for both fulltime/combined</p> <p>CHECK: Student</p>	<p>No formal check needed</p>	<p>CHECK: Dean's office [4 semesters of CDn01, n = 1-8, and 4 semesters of XD107]</p>	<p>Obtained credits for CDn01, n = 1-8, and XD107 for all semesters when student works at MUNI in Brno. Semesters when student is at international stay abroad are excluded.</p> <p>CHECK: Dean's office [IS.MUNI]</p>
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C) International experience and competitiveness	6. Further improving of English competences (attending courses, seminars, conferences, writing publications, all in English).	No formal check needed	No formal check needed	No formal check needed	No formal check needed CHECK: Dean's office [XD106]
	7. Stay or internship abroad - mandatory participation in international cooperation.		No formal check needed	No formal check needed	Minimum is 1 month foreign stay; longer stays (3+ months) are preferred considering the topic. Other forms of international cooperation must be approved by the Programme Board in order to obtain credits for XD110. CHECK: Dean's office [stay abroad in IS; XD110]
D) Pedagogical competences	8. Teaching assistance - classrooms, exercises, advising undergrad students and comparable.	Required 150 hours. Must complete during first four semesters. CHECK: Student	No formal check needed	CHECK: Dean's office [IS; XD102 for 4 semesters]	No formal check needed, requirements already fulfilled
E) Other transferrable skills.	9. Career development - preparation and management of projects, scientific writing, communication, other softskills.	No formal check needed Check offers of PHD TRAINING SCHOOL and outside of MUNI CHECK: Student	No formal sd check needed	No formal check needed	No formal check needed