FORMAL REQUIREMENTS AND ADMINISTRATION OF DOCTORAL STUDIES
Version: Released and applicable since 1st August 2019 (last updated: March, 2025)

PhD Programme: **CHEMISTRY/CHEMIE**
Doctoral Board – head contact: **Jiri Pinkas, jpinkas@chemi.muni.cz**

General outline:

- **Semesters 1 - 4 (first 2 years of study)** - students work on their research project + fulfil other requirements (theoretical courses, preparing for state doctoral exam – SDE*, teaching assistance
- **Semesters 5 - 8** - 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):

Mandatory courses: *checked by Dean's Office*

XD100	**Ph.D. thesis / Příprava dizertační práce**	*Enrolled every semester during entire studies, recommended 20-25 ECTS for semesters 1-4, 30 ECTS for semesters 5-8, 20 ECTS for semesters 9 +*
CDn01 (n = 1-8); and **XD107**	**Field seminar /Oborový seminář;** **Seminar of Ph.D. Chemistry studies /Seminář DSP Chemie**	Obligatory seminars for 8 semesters
C7777	**Handling chemical substances / Zacházení s chemickými látkami**	*Enrolled every year of study, every autumn semester*
XD102c**	**Teaching Assistance / Pomoc při výuce**	*150 hours total*
XD106	**Lecture in the foreign language /Odborná přednáška v cizím jazyce**	*Minimum once during studies (recommended 0 ECTS)*
	Placement Abroad /Zahraniční pracovní pobyt	*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)

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 SDE: *Theoretical preparation for SDE in following general topics according to student's specialization*

(**) Until the spring semester of 2025, the code for Teaching Assistance was XD102. Starting in the autumn semester of 2025, the new corresponding code will be XD102c.

Specialization Analytical Chemistry
- Modern trends in analytical chemistry
- Molecular and atomic spectrometry
- Separation methods
- Electroanalytical methods
- Analytical methods employed in applicant's thesis

Specialization Inorganic Chemistry
- Modern trends in inorganic chemistry
- Structural inorganic chemistry and methods for studying properties of inorganic compounds
- Coordination chemistry
- Solid state chemistry and inorganic materials chemistry
- Organometallic chemistry

Specialization Physical Chemistry
- Modern trends in physical chemistry
- Physical chemistry of equilibrium and non-equilibrium systems
- Theoretical and experimental methods of studies of structure of atoms and molecules
- Physical chemistry of dynamic changes
- Physico-chemical basis of methods used in dissertation work

Specialization Materials Chemistry
- Modern trends in materials chemistry
- Structure of materials and methods of study of material properties
- Testing of material properties
- Chemistry and phase transformations in material

Specialization Organic Chemistry
- Experimental and theoretical methods for study of structure and reactivity of organic compounds
- Synthesis of organic compounds
- Practical applications of organic compounds
- Modern trends in organic chemistry

Elements of the ISP		Milestones and their check			
		Enrolment to studies (Before Semester 1)	**End of Semester 1**	**End of Semester 4 (Theoretical State Doctoral Exam, SDE *)**	**End of Semester 8 (Preparation for PhD defence)**
(A) research and development activities (ca. 70 % of workload)	1. **Research, dissertation project,** literature search of the actual state of the topic, planning and the scientific activities itself (50 %).	Define framework topic of your PhD project with your supervisor for enrolment. CHECK: Dean's office [enrolment] Enrol and complete **XD100** for each semester (25 ECTS for semesters 1-4, 30 ECTS for semesters 5-8, 20 ECTS for semesters 9+] Enrol and complete Handling chemical substances (**C7777**) course in each Fall semester. CHECK: Dean's office	Submit **"Individual Study Plan"** for your PhD work to the Doctoral Board - a detailed research program and study plan of the whole study. CHECK: Doctoral Board [Submitted **Individual Study Plan**]	Prepare **"Short Thesis"** (10-20 pages of text without figures and schemes) containing literature review (this part may later be used as Introduction-Background to the final PhD thesis), state of the PhD project, results obtained so far. Submit the **"Short Thesis"** to the SDE committee. CHECK: Doctoral Board [SDE assessment]	Submit PhD thesis according to instructions of Doctoral Board, format according to SCI MUNI requirements. **The preferred** form of dissertation in the Chemistry DSP is a **complete treatise** Allowed form of dissertation is a **commented collection** of original publications. For the benefit of reviewers and committee members submit the following documents: 1. Summary of thesis in Czech and English, summarizing motivations and results of the work 2. Curriculum vitae of the author 3. List of publications and conference presentations CHECK: Doctoral Board, Dean's office

	2. **Publications** Dissertation thesis should be based on published or accepted papers demonstrating quality and independence of the student research work (15 %)	No formal check needed	No formal check needed	No formal check needed Publications of the student may be included in the **"Short Thesis"** for SDE (if relevant).	The admission of the dissertation thesis for the defense is based on fulfilling of the following criteria: 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. If the publication is ranked in more than one category, the best rank is considered. The student is **the first author** of at least **one** 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 Doctoral Board). OR 2. The student is the first author of **one publication** in journals ranked in **the first decile** in a particular category according to the Web of Science with an exception of review articles (this alternative is allowed only based on specific approval by the Doctoral Board). CHECK: Doctoral Board [Thesis].

	3. **Presentation** of results at scientific seminars, symposia, conferences etc., including preparation of talks and/or poster presentations (5 %)	No formal check needed	No formal check needed	No formal check needed A list of presentations may be included in the **"Short Thesis"** for SDE (if relevant).	A student must present **one** oral presentation at an international seminar or a conference in English to obtain credits for **XD106**. Credits are awarded by supervisors or by a person designated in advance by the Doctoral Board. CHECK: Dean's office [XD106]
(B) Specialized courses and theoretical preparation (20 %)	4. **Theoretical courses,** preparation to the state doctoral exam – SDE (15 %)	Select courses according to identified student's knowledge gaps and required topics for SDE in the selected specialization - see **general topics** for each specialization. Plan corresponding courses, trainings for the first two years. Consider courses at MU or outside. Minimum 4 courses completed with an exam and 4 credited courses are required. Selection can be changed/updated for each semester. CHECK: Supervisor	No formal check needed	Successfully pass minimum 4 courses completed with an exam and 4 credited courses. Courses completed abroad are approved by the Doctoral Board. CHECK: Dean's office [IS.MUNI] Have all other requirements fulfilled (see in this column) and submit **the application to theoretical SDE.** The Doctoral Board organizes SDE during Semester 5-6.	No formal check needed, requirements already fulfilled

	5. **Doctoral seminars** (5 %)	Enroll CDn01, n = 1-8 (Attendance is compulsory during the actual length of study). Seminar is not compulsory for students in the combined form of studies. Enroll 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 summarizing their results of dissertation work. This seminar is compulsory for students in the combined form of studies during the standard length of studies (the first 4 years), the lecture	No formal check needed	CHECK: Dean's office [4 semesters of CDn01, n = 1-8, and 4 semesters of XD107]	Obtained credits for CDn01, n = 1-8, and XD107 for all semesters when student works at MU in Brno. Semesters when student is at international stay abroad are excluded. CHECK: Dean's office [IS.MUNI]

		before dissertation defense is compulsory for both forms of studies (full-time and combined) CHECK: Student			
(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 a 1-month foreign stay, longer stays (3+ months) are preferred. Other forms of international cooperation must be approved by the Doctoral 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; XD102c 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 soft-skills.	No formal check needed Check offers of PHD TRAINING SCHOOL and outside of MU CHECK: Student	No formal check needed	No formal check needed	No formal check needed

Recommended theoretical courses for CHEMISTRY

Specialization Analytical Chemistry

C8102 Special Methods – Laboratory course (Novotný)
C5150 Trends in Analytical Chemistry (Preisler)
C9075 Advanced Liquid Chromatography (Urban)
C6135 Analysis of One-Dimensional Data (Vaculovič)
C7021 Separation Methods (Havliš)
C7031 Atomic Spectrometry (Kanický)
C7050 Electroanalytical Methods (Lubal, Trnková)
C7041 Molecular Spectrometry (Kanický, Táborský)
C7895 Mass Spectrometry of Biomolecules (Preisler)
C7080 Lasers in Analytical Chemistry (Novotný)
C6300 Optical and Mass Spectrometry with Inductively Coupled Plasma (Kanický)
C7075 Bioanalytical Chemistry in Laboratory Medicine (Bittová, Chromý)
C7073 Bioanalytics I – Biomacromolecules (Havliš)
C7072 Bioanalytics II - Analytical Methods in Clinical Praxis (Havliš)
C8835 Biocoordination Chemistry (Lubal, Táborský)

Specialization Inorganic Chemistry

C9888 Modern Trends in Inorganic Chemistry (Pinkas, Moravec, Stýskalík)

C7750 Advanced Coordination Chemistry (Nečas, Pinkas)
C9908 Hollow Organic and Metal-Organic Materials: Design, Preparation and Application (Jurček)
C8888 Nanochemistry (Pinkas)
C9981 Heterogeneous Catalysis (Stýskalík)
C7780 Inorganic Materials Chemistry (Pinkas)
C8840 Chemistry of Macrocyclic Compounds (Lubal)
C9930 Methods in Quantum Chemistry (Munzarová)
C4010 Inorganic Chemistry III (Pinkas, Příhoda)
C6310 Symmetry of Molecules and Crystals (Nečas)
C9906 Spectroscopic Methods of Nanomaterial Characterization (Špaňhel)
C8400 Quantum Chemistry of Solids, Calculations of Electronic structure (Šob)

Specialization Physical Chemistry

C8785 Photophysical Spectroscopic Methods (Heger)
C6132 Application of Hardware and Software Elements in Measuring Systems (Hrbáč)
C9550 Advanced Quantum Chemistry and Molecular Spectroscopy (Munzarová)
C6745 Advanced Physical Electrochemistry (Trnková, Třísková)
ENV006 Statistical Thinking and Data Treatment (Heger)
C5845 Theoretical and Experimental Methods in Advanced Biophysical Chemistry (Hritz, Trnková)
C5305 Computational Thermodynamics (Pavlů, Vřešťál)
C9545 Chemical Bond Theory (Foroutannejad)
C9930 Methods of Quantum Chemistry (Munzarová)
C6790 Mass Spectrometry (Brož)
C6770 NMR Spectroscopy of Biomolecules (Žídek, Fiala)

Specialization Materials Chemistry

C8965 Phase Transformations in Materials (Sopoušek)
C9135 Advanced Physico-Chemical Methods of Materials Study (Brož, Pavlů)
C5303 Advanced Modeling of Solids (Pavlů, Všianská)
C8975 Nanostructured Materials and their Applications (Sopoušek)

C8888 Nanochemistry (Pinkas)
C8400 Quantum Chemistry of Solids, Calculations of Electronic structure (Šob)
C7780 Inorganic Materials Chemistry (Pinkas)
C9888 Modern Trends in Inorganic Chemistry (Pinkas, Moravec, Stýskalík)
C9930 Methods of Quantum Chemistry (Munzarová)
C5305 Computational Thermodynamics (Pavlů, Vřešťál)

Specialization Organic Chemistry

C9115 Medicinal Chemistry (Paruch)
C4465 Advanced Organic Synthesis (Švenda)
C7765 Advanced Supramolecular Chemistry (Šindelář)
C8780 Photochemistry: From Concepts to Practice (Klán)
C7410 Structure and Reactivity (Klán)
C7415 Structure and Reactivity - seminar (Klán)
C8500 Organic Reaction Mechanisms (Klán)
C8510 Organic Reaction Mechanisms - seminar (Klán)
C5500 Stereochemistry of Organic Compounds (Mazal)
C4450 Organic Chemistry III – Synthesis (Paruch)
C4455 Organic Chemistry III – Synthesis - seminar (Paruch)
C8885 Supramolecular Chemistry (Mazal)