

FORMAL REQUIREMENTS AND ADMINISTRATION OF DOCTORAL STUDIES

PhD program: **Life Sciences**

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Detailed requirements for the Individual Study Plan (ISP) are described in Table. Here in brief:

- **Core subjects ca 65 % of workload (ISP elements A - B), Hard-skills courses ca 20 % of workload (ISP elements C), Soft-skills courses – ca 15 % of workload (ISP elements D - E)**
- **Semestral activities recorded as S5007 Ph.D. Thesis**– each semester
(recommendation: 25 ECTS for semesters 1-4, 30 ECTS for semesters 5-8, 20 ECTS for semesters 9+)
- **Handling chemical substances C7777** – obligatory for each autumn semester of study (except stay abroad)
- **Scientific publication S5008** – once during the study
- **Lecture for the scientific community S5006** – minimum once during the study
- **CEITEC Friday Seminar S5010** – obligatory in the 1st and 2nd year (autumn semester)
- **Field Seminar - Life Sciences S5050**– obligatory for all semesters of study (except stay abroad)
- **Stay abroad – (XD110)** obligatory a minimum one-month stay abroad in total during the study (ECTS according to faculty rules), Alternatively (after approval of doctoral board) participation in international creative project with results published or presented abroad, or direct participation in international cooperation.
- **TAC Meeting S5013** – minimum three times during the standard study duration
- **CEITEC PhD Conference S5012**– obligatory for each spring semester of study (except stay abroad)
- **Theoretical (hard-skills) courses** – a minimum of four courses (fulfil during the 1st and 2nd year)
- **Soft-skills courses** - a minimum of three courses (at least one course fulfil during the 1st and 2nd year)

(*) Requirements for theoretical State Doctoral Exam (SDE) and PhD defence:

SDE, thesis, as well as the PhD defence, are performed in English.

The Executive Committee of the Life Sciences Programme after discussion with the supervisor will select, with the presented general topics as a starting point, a set of three specific topics for the State Doctoral Examination based on the discussion, on completed hard skills courses and in a relation to the topic of the thesis.

Molecular aspects

- composition and structure of proteins, nucleic acids, glycans and lipids

Bioanalytical aspects

- separation and identification of bio(macro)molecules
- sequencing of biopolymers
- determining structure of bio(macro)molecules, its hierarchical aspects (primary, secondary, tertiary, quaternary, modifications, suprastructures)
- determining and quantifying interbiomolecular interactions (protein-protein interactions, protein-nucleic acid, protein-ligand)
- bioinformatics – molecular property predictions, experimental data analysis, gene ontology
- molecular modelling (basics of quantum mechanics, molecular mechanics)

Biological aspects

- general cellular and organismal functions of bio(macro)molecules
- proteins – cellular structure, metabolism, transport, signalling
- nucleic acids – genetic information, protein biosynthesis and its regulation, non-coding RNA, chromosomes and telomeres
- glycans – signalling, protein stabilisation, intra- & inter-cellular communication and interactions
- lipids – membranes, lipid rafts

The student is acquainted with the specified topics and, according to his / her choice, prepares a presentation of about 10 minutes for one of them. The presentation will be followed by a discussion on the chosen topic, as well as questions covering the area of the given discipline, based on the syllabus of the topics for the state doctoral examinations.

The PhD defence is given by 20 min presentation of results of the doctoral project, followed by a discussion.

Individual study plan elements		Milestones						
		Enrolment to studies (Before semester 1)	End of Semester 1	End of Semester 2	End of Semester 4 State Doctoral Exam – SDE*	End of Semester 6	End of Semester 7	End of Semester 8 PhD defence *
(A) research and development activities	1. Research, dissertation project, literature search of the actual state of the topic, planning, and the scientific activities itself	Define the framework topic of the PhD project with the supervisor for enrolment. CHECK: Dean's office [enrolment] S5007 for each semester (25 ECTS for semesters 1-4, 30 ECTS for semesters 5-8, 20 ECTS for semesters 9+) CHECK: Student	Submit TAC members proposal CHECK: Doctoral Board [Submitted proposal]	Submit a detailed "research project" for PhD work to the Doctoral Board. Max 5 pages containing Background, Research hypothesis and objectives, Approach-methods, Timeline of foreseen activities, Expected outcomes (publications). CHECK: TAC, Doctoral Board [Submitted project] Progress check by TAC - 1 st TAC meeting CHECK: Doctoral Board [TAC Meeting]	No formal check needed	Progress check by TAC - 2 nd TAC meeting CHECK: Doctoral Board [TAC Meeting]	Progress check by TAC – 3 rd TAC meeting CHECK: Doctoral Board [TAC Meeting]	Have all other requirements fulfilled (see below in this column) Submit a PhD thesis according to instructions of the Doctoral Board, format according to SCI MUNI requirements CHECK: Doctoral Board, Dean's office
	2. Publications thesis should be based on at least one first-author publication in Q1 demonstrating the quality and	No formal check needed	No formal check needed	No formal check needed	No formal check needed	Progress check by TAC - 2 nd TAC meeting CHECK: Doctoral Board [TAC Report]	Progress check by TAC – 3 rd TAC meeting CHECK: Doctoral Board [TAC Report]	At least one publication - minimum criteria: One student's first-author paper published in IF-journal in 1st quartile in the given field of study (ISI WOS).

	independence of the student							If this publication has not IF, in Q1, there should be two more publication with ID in Q1 or Q2 of which student should be the co-author. CHECK: Doctoral Board [Thesis,S5008]
	3. Presentation of results on scientific seminars, symposia, conferences, etc., including preparation of talks	No formal check needed	No formal check needed	No formal check needed	No formal check needed	Poster presentation at CEITEC PhD Conference CHECK: Doctoral Board [S5012] Progress check by TAC - 2 nd TAC meeting CHECK: Doctoral Board [TAC Report]	Progress check by TAC – 3 rd TAC meeting CHECK: Doctoral Board [TAC Report]	At least one documented oral presentation in English to appropriate scientific audience, preferentially international conference. CHECK: Doctoral Board, [S5006] Oral presentation at CEITEC PhD Conference. CHECK: Doctoral Board [S5012]
	4. CEITEC Friday Seminar	Enroll S5010 (obligatory seminar for two semesters) CHECK: Student	No formal check needed	No formal check needed	CHECK: Doctoral Board, [S5010]	Not relevant anymore, all requirements fulfilled before.	Not relevant anymore, all requirements fulfilled before.	Not relevant anymore, all requirements fulfilled before.
	5. Field seminar	Enroll S5050 (obligatory for all semesters) CHECK: Student	No formal check needed	No formal check needed	CHECK: Doctoral Board, [S5005/S5003]	No formal check needed	No formal check needed	Credits for S5050 for all semesters, (semesters of international stay abroad are excluded) CHECK: Doctoral Board, [S5050]
(B) International experience and competitiveness	6. Further improving English competences , attending courses, seminars, conferences, writing	No formal check needed	No formal check needed	No formal check needed	No formal check needed	Progress check by TAC - 2 nd TAC meeting CHECK: Doctoral Board [TAC Report]	Progress check by TAC – 3 rd TAC meeting CHECK: Doctoral Board [TAC Report]	At least one documented oral presentation in English to appropriate scientific audience, preferentially international conference. CHECK: Doctoral Board, [S5006]

	publications, all in English							
	7. Stay or internship abroad, mandatory participation in international cooperation	No formal check needed	No formal check needed	No formal check needed	No formal check needed	Progress check by TAC - 2 nd TAC meeting CHECK: Doctoral Board [TAC Report]	Progress check by TAC – 3 rd TAC meeting CHECK: Doctoral Board [TAC Report]	The minimum is one-month stay abroad in total. CHECK: Doctoral Board, Dean's office [XD110]
(C) Specialized courses and theoretical preparation	8. Theoretical courses, preparation to the state doctoral exam – SDE	Identify student's knowledge gaps and what should be learned for SDE. Plan courses, trainings for the first two years. Consider courses at MU/outside. Minimum four credited courses are required. Selection can be changed/ updated for each semester. C7777 Handling chemical substances CHECK: Supervisor	Handling chemical substances CHECK: Dean's office [C7777]	No formal check needed	Have all other requirements fulfilled and submit the application to the state doctoral exam SDE (Doctoral Board organizes SDE further) CHECK: Doctoral Board, [IS.MUNI]	Handling chemical substances CHECK: Dean's office [C7777]	Handling chemical substances CHECK: Dean's office [C7777]	Not relevant anymore, all requirements fulfilled before.
(D) Pedagogical competences	9. Teaching assistance, optional - classrooms, exercises, advising undergrad	Optional – included in the limit of Soft-skills courses. (Up to 150 hours through the entire doctoral	No formal check needed	No formal check needed	No formal check needed	CHECK: Doctoral Board [S5009]	Not relevant anymore, all requirements fulfilled before.	Not relevant anymore, all requirements fulfilled before.

	students, and comparable.	studies). Recommend: pass during the first three years. CHECK: Student						
(E) Other transferrable skills	10. Soft skills courses - Career development, preparation and management of projects, scientific writing, communication, other soft-skills	Plan courses, trainings. Consider courses at MU or outside. Minimum three credited courses are required. Selection can be changed/ updated for each semester Recommend: Minimum one credited course pass during first two years. CHECK: Student.	No formal check needed	No formal check needed	Successfully pass a minimum of 1 credited soft skills courses CHECK: Doctoral Board [IS.MUNI]	Successfully pass a minimum of 3 credited soft skills courses CHECK: Doctoral Board [IS.MUNI]	Not relevant anymore, all requirements fulfilled before.	Not relevant anymore, all requirements fulfilled before.

Recommended courses (an indicative list only)

Hard-skills courses	Soft-skills courses
<p>S1001 Chemical properties, structure and interactions of nucleic acids</p> <p>S1002 Chemical properties, structure and interactions of nucleic acids – practical course</p> <p>S1003 Structural and molecular biology of RNA</p> <p>S1004 Methods for structural characterization of biomolecules</p> <p>C5320 Theoretical Concepts of NMR</p> <p>C9940 3-Dimensional Transmission Electron Microscopy (3DEM)</p> <p>S2004 Methods for Characterization of Biomolecular Interactions – Classical versus Modern</p> <p>S2005 Methods for characterization of biomolecular interactions – classical versus modern, practice</p> <p>S3002 Nanobiotechnology</p> <p>C6770 NMR Spectroscopy of Biomolecules I</p> <p>C6775 NMR Spectroscopy of Biomolecules II</p> <p>C7270 Structural biology methods</p> <p>C7271 Structural biology methods practical</p> <p>C7995 Practical NMR Spectroscopy of Biomolecules</p> <p>S2002 Methods in plant cytogenetics and cytogenomics I. - practical course</p> <p>S2003 Methods in plant cytogenetics and cytogenomics II. - practical course</p> <p>CG990 Methods in proteomics</p> <p>CG910 Proteomics</p> <p>C7230/S2006 Fluorescence methods in life sciences - a journey from molecules to cells</p> <p>C7235/S2007 Fluorescence methods in life sciences - practice</p> <p>S2008 Developmental and Cellular Biology of Plants</p> <p>S2010/C8545 Developmental biology</p> <p>S2011 Hormones in plant development</p> <p>S2012 Applying Mendel's laws of genetics to plant biology in the lab</p> <p>S2015 Synthetic Biology</p>	<p>CST: FR FRESHERS: Skills for Research Careers</p> <p>S4001 International Performance</p> <p>S4002 Law, Ethics and Philosophy of Science</p> <p>S4010 Science Communication Course: Present Your Research Results with Confidence</p> <p>C2110 UNIX and programming</p> <p>JSFF_AP1 Academic English Composition</p> <p>JSFF_AP2 Academic Presentation Skills in English</p> <p>S5040 Publish or perish: The art of research and scientific writing</p> <p>S5009 Teaching assistance (max 150 hours during the study).</p>