UNIVERSITY OF PARDUBICE Faculty of Chemical Technology	
DIRECTIVE No. 5/2025	
Subject:	Courses for Students in Doctoral Degree Programmes at the Faculty of Chemical Technology, University of Pardubice
Scope of applicability:	All departments of the Faculty of Chemical Technology at the University of Pardubice, students, supervisors and guarantors of doctoral study programmes
Effective from:	1 September 2025
Reference number:	UPCE/dfcht/00016409/2025
Compiled and submitted by:	doc. Ing. Petr Česla, Ph.D., Vice-Dean for Research and Creative Activities doc. Ing. Alena Komersová, Ph.D., Vice-Dean for External Relations prof. Ing. Petr Mošner, Dr., Vice-Dean for Education prof. Ing. Liběna Tetřevová, Ph.D., Vice-Dean for Internal Affairs
Approved by:	prof. Ing. Petr Němec, Ph.D.

Article 1

The Directive supplements Section 47 of Act No. 111/1998 Coll., on Higher Education Institutions and on Amendment and Supplementation of Other Acts (the Higher Education Act), as amended (hereinafter referred to as the "Higher Education Act") as well as the Section III of the Study and Examination Regulations of the University of Pardubice (hereinafter referred to as "SER UPCE") and Directive FChT UPCE No. 3/2025.

Article 2

(1) The study in the doctoral degree programme **Analytical Chemistry** is delivered by means of an individual study plan consisting of one compulsory course **English for scientists** – **B2+**, and at least three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
New Trends in Processing and Technology of Food
Analysis of Toxicologically Important Substances
Modern Methods of Protein Analysis
Advances Immunoanalytical Methods
Modern Methods of Atomic Spectrometry

Development and Optimization of Advanced Chromatographic and Electrophoretic Separation Methods
Analytical Chemometry
Coupling of Modern Separation and Spectral Techniques in Analysis of Biologically Active Compounds in Natural Matrices
Modern Trends in Sample Treatment and Trace Analysis
Trends in Bioanalytical Instrumentation
Advanced Mass Spectrometry
Lipidomic Analysis
Modern Trends in Food Microbiology
Modern Trends in Analysis of Inorganic Materials and Resources
Electroanalytical Chemistry: Selected Chapters

(2) The study in the doctoral degree programme **Inorganic Chemistry** is delivered by means of an individual study plan consisting of one compulsory basic theoretical course **Modern Trends in Inorganic Chemistry**, mandatory course **English for scientists** – **B2+**, and two core elective courses. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
NMR Spectroscopy
X-ray Analysis
Advances in Bioinorganic Chemistry
Homogenous Catalysis
Symmetry of Molecules and its Applications
Complementary Methods of Structural Research
Advances in Organometallic and Coordination Chemistry
Quantum Chemistry Applications
Advanced Solid State Chemistry

(3) The study in the doctoral degree programme **Inorganic Technology** is delivered by means of an individual study plan consisting of two compulsory courses **Advanced Inorganic Technology**, **English for scientists** – **B2+**, and at least two core elective courses. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
Methods of Characterization in Inorganic Technology
Advanced Evaluation of Inorganic Pigments
Management Systems in Chemical Industry for Engineers
Study of Solid State Reactions
Phase Transitions
Adsorption on Solids
Chemical Engineering Processes in Inorganic Technology
Advanced Calorimetric and Thermoanalytic Methods
Current Trends in Analysis of Inorganic Materials and Resources
Nanomaterials and Nanotechnology

(4) The study in the doctoral degree programme **Biochemistry** is delivered by means of an individual study plan consisting of one compulsory course **English for scientists** – **B2+**, and at least three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
Biochemistry of Microorganisms
Biochemistry of Immunopathological States
Cellular Signaling
Lipidomic Analysis
Metabolomics
Pathobiochemistry
Advanced Immunochemistry
Advanced Methods of Cell Biology
Advances in Bioorganic Chemistry
Plant Biochemistry
Techniques for Immobilization and Conjugation of Bioactive Substances

(5) The study in the doctoral degree programme **Physical Chemistry** is delivered by means of an individual study plan consisting of one compulsory course **English for scientists** – **B2+**, and three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
Zeolites and Molecular Sieves
Spectroscopy in Catalysis
Advanced Calorimetric and Thermal Analysis Methods
Statistical Thermodynamics
Advanced Chemistry of Solids
Chemical Kinetics
Adsorption on Solids
Methods of Modelling in Physical Chemistry
Kinetic Processes in Glass-forming Systems
Advanced Phase Equilibrium
Modeling in Pharmacokinetics and Pharmacodynamics
Advances and Trends in Pharmacochemistry
Testing Methods of Pharmaceutical Technology
Photocatalytic Processes

(6) The study in the doctoral degree programme **Chemical and Process Engineering with specialization in Chemical Engineering and Environmental Engineering** is delivered by means of an individual study plan consisting of one basic theoretical course **Separation Processes in Chemical and Environmental Engineering**, one compulsory course **English for scientists** – **B2+**

and two core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses – specializace Chemical Engineering:
Diffusion. Mass Transfer in Fluid Systems
Diffusion and Electrodiffusion Membrane Processes
Chemical Kinetics and Reactors
Mathematical Modelling in Chemical Processes
Numerical Methods for Chemical Engineers
Optimization
Theoretical Aspects of Fluid Flow and Heat Transfer
Pressure Driven Membrane Processes
Selected Difussional Operations

Core elective courses – specializace Environmental Engineering
Ecotoxicology
Electrochemistry in Environmental Protection
Environmental Biotechnology
Environmental Nanochemistry
Modern Methods of Waste Disposal
Monitoring of Contaminants in the Environment
Planning and Analysis of the Environmental Experiment
Advanced Environmental Technologies
Pressure Driven Membrane Processes
Sustainable Technologies in Chemical Production

(7) The study in the doctoral degree programme **Chemistry and Technology of Inorganic Materials** is delivered by means of an individual study plan consisting of one compulsory course **English for Scientists – B2+** and at least three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
Advances in the Chemistry and Technology of Inorganic Materials
Advanced Chemistry of Solids
Selected Chapters from Solid State Physics
Preparation of Thin Films and Coatings
Materials for Electronics, Optics and Optoelectronics
Nanomaterials and Nanotechnology
Optical Properties of Non-crystalline Materials
Materials for Thermoelectric Applications
Advanced Characterization Methods of Powders
Thermoanalytical Methods of the Investigation of Non-crystalline Materials
Advanced Surface Characterization Methods of Materials
Study of Inorganic Materials Structure by Vibrational and Electron Spectroscopy
NMR and ESR of Solids

(8) The study in the doctoral degree programme **Engineering of Energetic Materials** is delivered by means of an individual study plan consisting of one compulsory course **English for scientists – B2+** and three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
Advanced Theory of Explosion I
Advanced Theory of Explosion II
Advanced Technology of Energetic Materials
Advanced Pyrotechnic and Propellants
Advanced Safety Engineering
Infrared and Raman Spectroscopy of Energetic Materials
Advanced Organic Synthesis
Advanced Chemistry of Heterocyclic Compounds
Modern Trends in Inorganic Chemistry
Advances in Organometallic and Coordination Chemistry
Modern Materials
Advanced Calorimetric and Thermal Analysis Methods
Numerical Methods for Chemical Engineers

(9) The study in the doctoral degree programme **Organic Chemistry** is delivered by means of an individual study plan consisting of one compulsory course **English for scientists – B2+** and at least three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
Advanced Organic Synthesis
Advanced Organic Materials
Construction of C-C and C-X Bonds Using Modern Organometallic Reagents
Exploring Organic Molecules Using Quantum-Chemical Calculations
Advanced Stereochemistry
Advances in Bioorganic Chemistry
Advanced Physical Organic Chemistry
Kinetic Methods in Physical Organic Chemistry
Contemporary Trends in Study of Reaction Mechanisms
Advances and Trends in Pharmacochemistry
Modern Methods of Heterocycles Synthesis
Supramolecular Chemistry
Mass Spectrometry in Organic Analysis
Advanced NMR Spectroscopy of Organic Compounds

(10) The study in the doctoral degree programme **Organic Technology** is delivered by means of an individual study plan consisting of one compulsory course **English for scientists – B2+** and at least three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:
Advanced Organic Dyes and Pigments
Functional Colorants
Advanced Technology in Application and Coloring
Photochemical Technology
Advances and Trends in Pharmacochemistry
Human Physiology
Structure and Properties of Bio-polymers and Their Physical and Chemical Treatment
Medical Nanobiotechnology
Advanced Safety Engineering
Advanced Physics of Explosion
Advanced Technology of Energetic Materials
Infrared and Raman Spectroscopy of Energetic Materials
Advanced Technologies in Industrial Synthesis
Advanced Processes and Equipment in the Industrial Synthesis
Industrial Catalytic Processes
Advanced Organic Synthesis
Quantum Chemistry Methods
Advanced Chemistry of Heterocyclic Compounds
Advanced NMR Spectroscopy of Organic Compounds
Process Management of Production Systems
Strategic Marketing Management
Advanced Formulations of |Physical – Chemical Problems

(11) The study in the doctoral degree programme **Surface Engineering** is delivered by means of an individual study plan consisting of one compulsory course **English for scientists – B2+** and at least three core elective courses from the list specified below. The selection of core elective courses shall be made under supervisor's guidance and shall correspond with the focus of the dissertation.

Core elective courses:

Chemistry of Organic Coatings
Selected Chapters from Macromolecular Chemistry
Materials Science
Formulation and Formation of Organic and Functional Coatings
Separation and Characterization of Synthetic and Natural Macromolecules
Advanced Methods of Thermal Analysis
Thin Films and Coatings
Materials for Photonics
Stability and Degradation of Materials
Printing Technologies for Materials Research
Physics of Surfaces

Article 3

Transitional and Final Provisions

(1) This Directive shall become valid on the date of signature.

(2) This Directive shall become effective on 1 September 2025.

(3) This Directive applies to students enrolling in the first year of a doctoral study programme starting in the academic year 2025/2026. FChT Directives No. 10/2019 do not apply to these students.

In Pardubice, on 13 August 2025

prof. Ing. Petr Němec, Ph.D.
Dean