

Training Program

of the Krakow School of Interdisciplinary PhD Studies

I. GENERAL PROVISIONS

§ 1

Training at the Krakow School of Interdisciplinary PhD Studies, hereinafter referred to as the “PhD School”, is provided jointly by: the Henryk Niewodniczański Institute of Nuclear Physics of the Polish Academy of Sciences (IFJ PAN) as the Coordinating Unit, Jerzy Haber Institute of Catalysis and Surface Chemistry of the Polish Academy of Sciences (IKiFP PAN), Jerzy Maj Institute of Pharmacology of the Polish Academy of Sciences (IF PAN), Aleksander Krupkowski Institute of Metallurgy and Materials Science of the Polish Academy of Sciences (IMIM PAN) and AGH University of Science and Technology in Krakow (AGH).

§ 2

Training at the PhD School prepares students to obtain a PhD degree.

§ 3

The PhD School provides training in:

- 1) the field of natural sciences and the disciplines of: physical sciences, chemical sciences,
- 2) the field of medical and health sciences and the discipline of medical sciences,
- 3) the field of engineering and technology and the discipline of materials engineering.

§ 4

The PhD School shall offer the PhD Students conditions for:

- 1) pursuing independent research, including the research conducted outside the Units constituting the PhD School, by implementing an individual research proposal and an individual training program,
- 2) preparing a doctoral dissertation within one discipline or an interdisciplinary dissertation within the disciplines in which the PhD School offers training under the mentorship of a supervisor or supervisors, and an auxiliary supervisor or auxiliary supervisors, if needed,

- 3) participating in an existing or initiating a new scientific collaboration with research teams working at other research units, both in Poland and abroad,
- 4) contributing to the national and international scientific community by systematic presentation of research results in the scientific environment, preparation of research papers for publication and active participation in scientific conferences,
- 5) attaining competencies to conduct selected classes,
- 6) preparing for the conferment of the degree of doctor under the mentorship of a supervisor (or supervisors in the case of conducting interdisciplinary studies) or a supervisor and an auxiliary supervisor.

II. DURATION AND RESULTS OF TRAINING

§ 5

Training at the PhD School lasts from 6 to 8 semesters and enables the PhD students to achieve learning outcomes corresponding to the qualifications at level 8 of the Polish Qualifications Framework for the discipline or disciplines within which a doctoral dissertation is under preparation.

§ 6

As a result of training at the PhD School a PhD student achieves the following learning outcomes in the category of knowledge (codes in accordance with the Regulation of the Ministry of Science and Higher Education of November 14, 2018 (item 2218)):

1) A PhD student knows and understands:

- a) EU1(P8S_WG) to an extent that allows effective revision of existing paradigms, the global body of work including theoretical foundations as well as general issues and selected specific problems (specific to the scientific discipline or disciplines within which a PhD student prepares a doctoral dissertation);
- b) EU2 (P8S_WG) main development trends in the scientific disciplines in which training is provided;
- c) EU3 (P8S_WG) methodology of scientific research;
- d) EU4 (P8S_WG) rules for disseminating the results of scientific activity, including the open access mode;
- e) EU5 (P8S_WK) fundamental problems of contemporary civilization,
- f) EU6 (P8S_WK) economic, legal, ethical and other relevant factors affecting scientific activity;

g) EU7 (P8S_WK) basic principles related to the transfer of knowledge to business and social domains as well as the commercialization of the output of scientific activity and the know-how related to this output.

§ 7

As a result of training at the PhD School a student achieves the following learning outcomes in the category of skills (codes in accordance with the Regulation of the Ministry of Science and Higher Education of November 14, 2018 (item 2218)):

1) A PhD student can:

- a) EU8 (P8S_UW) use the knowledge from various areas of science for creative identification, formulation and innovative handling of complex research problems, as well as – specifically – define the purpose and subject of scientific research, formulate research assumptions, develop research methods, techniques and tools and creatively use these; draw conclusions based on the output of scientific research; perform critical analysis and evaluation of research output, expert activity and other work of creative nature and its contribution into the development of knowledge; transfer the output of scientific activity to business and social domains;
- b) EU9 (P8S_UK) communicate on specialist topics to an extent that will enable active contribution to the international scientific community;
- c) EU10 (P8S_UK) disseminate the output of scientific activity, including popular forms addressed to broad audience;
- d) EU11 (P8S_UK) initiate debates and take active part in the scientific discourse;
- e) EU 12 (P8S_UK) use a foreign language at B2 level of the Common European Framework of Reference for Languages to an extent that allows active contribution into an international research and professional community;
- f) EU 13 (P8S_UO) plan and implement – both individually and as part of a team – research and creative projects, also in an international environment;
- g) EU 14 (P8S_UU) independently plan and act towards personal development as well as inspire and organize the development of other people; plan classes or courses and conduct them using modern methods and tools.

§ 8

As a result of training at the PhD School a student achieves the following learning outcomes in the category of social competencies (codes in accordance with the Regulation of the Ministry of Science and Higher Education of November 14, 2018 (item 2218)):

1) A PhD student is prepared to:

- a) EU15 (P8S_KK) critically review the body of work within a given scientific discipline, critically review his/her own contribution into the development of the discipline, recognize the importance of knowledge in addressing problems of cognitive and practical nature;
- b) EU16 (P8S_KO) fulfill social obligations imposed on the researcher, initiate actions for the benefit of the public, think and act in an entrepreneurial manner;
- c) EU17 (P8S_KR) preserve and foster the values represented by the community of researchers and creators, including independent pursuit of research and respect for the principle of public ownership of research output while demonstrating compliance with the principles of intellectual property protection.

§ 9

A PhD student is obliged to document the achievement of all learning outcomes and satisfy all the requirements provided for in the training program of the PhD School prior to the submission of a doctoral dissertation. The mode of documenting learning outcomes shall be stipulated in the "Organizational Regulations on Education at the Krakow School of Interdisciplinary PhD Studies".

III. FORMS OF TRAINING

§ 10

The PhD School develops general skills, including those falling outside of the scope of the discipline of the doctorate, as well as specialist and soft skills.

§ 11

As a result of training at the PhD School the students shall demonstrate an interdisciplinary approach to solving problems posed by contemporary science.

§ 12

1. Training at the PhD School shall be provided in the form of:

- 1) individual training,
- 2) student participation in conferences and scientific internships,
- 3) vocational training,
- 4) preparation of scientific papers and a doctoral dissertation by a student.

2. Individual training is composed of:

- 1) training based on an individual research proposal developed jointly by a PhD student and his/her supervisor(s) specifying the subject matter, scope and schedule of research work leading to on-time completion of education and preparation of a doctoral dissertation,
- 2) individual training pursued as an individual training program based on joint classes provided by the PhD School and conducted in the Polish or English language, encompassing general and specialist lectures, seminars, and recitation and laboratory classes as well as training in the scope of soft and teaching skills.

IV. INDIVIDUAL RESEARCH PROPOSAL

§ 13

1. Within 12 months of starting doctoral training a PhD School student is obliged to prepare an individual research proposal referred to in Article 202 of the Act of July 20, 2018 – Law on higher education and science (Journal of Laws of 2018, item 1668, as amended).
2. A PhD student shall prepare the individual research proposal referred to in Para. 1 jointly with his/her supervisor or supervisors.
3. If the scientific mentorship over the preparation of a doctoral dissertation is provided also by an auxiliary supervisor, the individual research proposal referred to in Para. 1 should be evaluated also by this supervisor.
4. A PhD student presents the individual research proposal referred to in Para. 1 to the PhD School Director through the competent PhD School Deputy Director for its verification and approval.
5. The manner and detailed rules of presenting, verification and approval of the individual research proposal referred to in Para. 1 shall be specified in the “Organizational regulations on education at the Krakow School of Interdisciplinary PhD Studies”.

§ 14

The implementation of an individual research proposal should ensure that the doctoral training is completed on time and that the learning outcomes referred to in § 6-8 are achieved.

§ 15

1. As of the second year of training an individual research proposal may be updated before the commencement of every semester.
2. The mode and detailed rules of updating the individual research proposal referred to in § 13, Para. 1 are specified in the “Organizational regulations on education at the Krakow School of Interdisciplinary PhD Studies”.

§ 16

1. At the end of each year of training a PhD School student is obliged to submit an annual report to the competent PhD School Deputy Director.
2. The report referred to in Para. 1 specifies the progress of work and shall require the approval of a supervisor or supervisors.
3. The report referred to in Para. 1 shall be reviewed by a committee composed of:
 - a. the PhD School Director,
 - b. the competent PhD School Deputy Director at a given Unit,
 - c. senior research worker of the competent Unit appointed by its Director or Rector, or a person authorized by the Rector.
4. A model form of the report referred to in Para. 1 shall be defined by the PhD School Director by way of a decree.

V. INDIVIDUAL TRAINING PROGRAM

§ 17

1. During training at the PhD School, a PhD student is obliged to complete courses included in the relevant training modules given in Annexes A and B hereto, including:
 - 1) courses included in the general module,

- 2) courses included in the interdisciplinary module,
- 3) courses included in the specialist module,
- 4) workshops included in the soft skills module,
- 5) doctoral seminar,
- 6) vocational training.

2. The general module encompasses courses preparing the students to master a set of skills necessary to conduct research and academic teacher work. The module is obligatory for all PhD students.

3. The interdisciplinary module encompasses general issues of the disciplines within which training is provided at the PhD school. The module is obligatory for the PhD students in the scope of courses falling outside of the major discipline.

4. The specialist module encompasses specific problems of the disciplines within which training is provided at the PhD School. The module is obligatory for the PhD students preparing a doctoral dissertation within a given discipline.

5. The soft skills module is conducted in the form of the following workshops “The ABC of a young researcher I” and “The ABC of a young researcher II” and includes: courses in the scope of skills necessary for preparation of scientific publications and conference lectures, knowledge of sources and rules of funding science, including the system of grants and principles governing the preparation of grant applications, knowledge of intellectual property protection rights and open access policy.

6. The doctoral seminar shall be delivered separately for each year of study.

7. A PhD student is obliged to complete the successive modules in the amount of:

- 1) general module – 40 hours to be chosen from the didactic offer of the PhD School,
- 2) interdisciplinary module – 40 hours to be chosen from the didactic offer of the PhD School,
- 3) specialist module – 60 hours to be chosen from the didactic offer of the PhD School,
- 4) soft skills module – 30 hours,
- 5) doctoral seminar – 80 hours,
- 6) vocational training – 30 hours.

§ 18

1. The didactic offer of the PhD School is announced every year.
2. Through its wide didactic offer brought by the Units, the PhD School provides the PhD students with conditions allowing the extension of the obligatory training program announced for a given academic year by elective courses.
3. The elective courses to be offered may include: lectures organized by the PhD School and conducted by foreign lecturers or, with the consent of a supervisor, classes held at other scientific units.

§ 19

1. Within training at the PhD School, a PhD student is obliged to complete the vocational training referred to in § 17, Para. 1, Point 6.
2. The vocational training referred to in Para. 1 should be completed within the limit of at least 30 hours for the whole duration of doctoral training.
3. The vocational training referred to in Para. 1 can take the form of:
 - a. conducting classes,
 - b. supervising apprentices, interns, bachelor's and master's students,
 - c. preparing presentations for science outreach events organized at the Units,
 - d. internships at accredited laboratories
 - e. internships and study tours.
4. The settlement of vocational training hours shall be carried out by the competent PhD School Deputy Director at the request of a supervisor.

§ 20

During training at the PhD School a PhD student is obliged to take active part in seminars organized by the Unit and research groups he/she is affiliated with.

VI. MENTORSHIP OVER THE DEVELOPMENT AND IMPLEMENTATION OF AN INDIVIDUAL TRAINING PROGRAM

§ 21

1. Every PhD student is obliged to develop a detailed schedule of the implementation of an individual training program at the PhD School together with his/her supervisor or supervisors for each year of study.
2. The schedule referred to in Para. 1, signed by a PhD student and his/her supervisor or supervisors, shall be submitted for the approval of the competent PhD School Deputy Director within specified deadlines.
3. The approved schedule of the implementation of a training program is forwarded to the PhD School Director and the PhD School Secretary's Office for information.
4. It is a duty of the PhD School Director to verify the compatibility of the schedule with the PhD School program and legal regulations.

§ 22

1. The settlement of a PhD student's progress shall be carried out on an annual basis, unless in justified individual cases the PhD School Director in agreement with the competent Deputy Director decides otherwise.
2. To complete a given year of doctoral training a student is obliged to:
 - a) get a pass in obligatory and elective courses, complete vocational training and any other research activity undertaken by a PhD student in a given academic year in accordance with the individual training program referred to in § 17,
 - b) submit the annual report referred to in § 16 and including detailed information on the progress in the implementation of an individual research proposal and advancement in research work constituting the subject matter of a doctoral dissertation, within the deadline and place indicated by the PhD School Director.
3. A pass is documented in a PhD student's record book.
4. If the settlement of a given year differs from the schedule of the implementation of an individual training program that has been previously developed and approved, a PhD student is obliged to submit a written justification for the existing discrepancies, approved by his/her supervisor or supervisors.

5. If the progress and advancement in work demonstrated in an annual report differs from the schedule of the implementation of an individual research proposal, a PhD student is obliged to submit a written justification for the differences, approved by his/her supervisor or supervisors, and prepare an appropriate correction of the individual research proposal.

6. An annual report and its potential discrepancies in relation to an individual research proposal as well as fulfillment of the requirements specified in Para. 2, Letter a shall be reviewed by the committee referred to in § 16, Para. 3.

§ 23

If a PhD student fails to get the passes specified in § 22, **Para. 2**, Letter a and:

a) fails to remedy the deficiencies within 30 days of submitting the report, or

b) the committee referred to in § 16, Para. 3 disapproves the justifications referred to in § 22, Para. 4 and 5,

the PhD School Director may apply to the Director or Rector of the competent Unit for having the PhD student removed from the list of the PhD School students.

VII. MID-TERM EVALUATION

§ 24

1. The PhD School students undergo a mid-term evaluation after completing the second year of training.

2. The rules and manner of conducting a mid-term evaluation shall be specified in the “Organizational Regulations on Education at the Krakow School of Interdisciplinary PhD Studies”.

§ 25

1. A negative result of a mid-term evaluation shall result in removal from the list of the PhD School students.

2. The manner of appealing against a negative mid-term result shall be stipulated in the “Organizational Regulations on Education at the Krakow School of Interdisciplinary PhD Studies”.

VIII. FINAL PROVISIONS

§ 26

The provisions of this Training Program shall come into force on the day of its approval by the competent Scientific Councils of the Units being institutes of the Polish Academy of Sciences and the AGH Senate.

Annex A

Total number of hours of obligatory courses 250 hours + vocational training:

general module 40 hours,

interdisciplinary module 40 hours,

specialist module 60 hours,

soft skills workshops 30 hours,

interdisciplinary doctoral seminar 80 hours

vocational training at least 30 hours

Course	Number of hours	ECTS	Manner of completion	Learning outcomes
First year				
First semester				
Independent research under the mentorship of advisors/supervisors	-	-		EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
General module				EU1, EU2, EU8, EU15
e.g. Teaching	20		Exam (egz.)	
e.g. Mathematics in Computers: Matlab, Mathematica and other	20		Exam	
e.g. Neural network	20		Exam	
Interdisciplinary module				EU1, EU2, EU8, EU15
Lecture 1, e.g. Interdisciplinary aspects of physics	20		Exam	
Lecture 2, e.g. Interdisciplinary aspects of chemistry	20		Exam	
Elective module				EU1, EU2, EU8, EU12, EU15
e.g. specialist English language course, lectures given by foreign lecturers			Pass (zal.)	

Second semester				
Independent research under the mentorship of a supervisor(s)	-	-		EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
General module				EU1, EU2, EU8, EU15
e.g. Statistics	20		Exam	
e.g. Modern programming languages: C++, Python, etc.	20		Exam	
e.g. Machine learning	20			
Interdisciplinary module				EU1, EU2, EU8, EU15
Lecture 3, e.g. Modern-age diseases	20		Exam	
Lecture 4, e.g. Interdisciplinary aspects of materials engineering	20		Exam	
Doctoral seminar	20		Pass	EU4, EU5, EU8, EU9, EU10, EU11, EU15
Soft skills module Workshop „The ABC of a young researcher 1“: rules for preparing presentations and writing scientific papers, research funding, knowledge of the system of grants	15		Test	EU4, EU5, EU6, EU7, EU10, EU14, EU16, EU17
Elective module				EU1, EU2, EU8, EU12, EU15
e.g. specialist English language course, lectures given by foreign lecturers			Pass	
Second year				
Third semester				
Independent research under the mentorship of a supervisor(s)				EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
Specialist module				EU1, EU2, EU3, EU8, EU13
Specialist lecture 1 for each discipline	30		Exam	

Specialist lecture 2 for each discipline	30		Exam	
Elective module				EU1, EU2, EU8, EU15
e.g. Natural philosophy				
Fourth semester				
Independent research under the mentorship of a supervisor(s)	-	-		EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
Specialist module				EU1, EU2, EU3, EU8, EU13
Specialist lecture 3 for each discipline	30		Exam	
Specialist lecture 4 for each discipline	30		Exam	
Doctoral seminar	20		Pass	EU4, EU5, EU8, EU9, EU10, EU11, EU15
e.g. Bioethics			Pass	
Third year				
Fifth semester				
Independent research under the mentorship of a supervisor(s)	-	-		EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
Doctoral seminar	20	1	Pass	EU4, EU5, EU8, EU9, EU10, EU11, EU15
Elective module				EU1, EU2, EU8, EU15
e.g. <i>foreign lecturers</i>			Pass	
Sixth semester				
Independent research under the mentorship of a supervisor(s)	-	-		EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
Elective module				EU1, EU2, EU8, EU15
e.g. foreign lecturers			Pass	
Soft skills module	15		Test	EU4, EU5, EU6, EU7, EU10, EU14, EU16, EU17
Workshop „The ABC of a young researcher 2“: e.g. social communication, copyright, open access				

<i>rules, details on the procedure for conferring a doctoral degree</i>				
Fourth year				
Seventh semester				
Independent research under the mentorship of a supervisor(s)	-	-		EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
Eighth semester				
Independent research under the mentorship of a supervisor(s)	-	-		EU1, EU2, EU3, EU8, EU9, EU10, EU11, EU13, EU14, EU15, EU16, EU17
Doctoral seminar	20		Pass	EU4, EU5, EU8, EU9, EU10, EU11, EU15
Presentation of doctoral dissertation's theses				
In total:	250			

Explanatory notes:

Manner of completion: zal. – zaliczenie (pass), egz. – egzamin (exam)

Annex B

Obligatory courses - specification

Name	Unit	Number of hours	ECTS points
Doctoral seminar – 80 hours		4x20	
General module – obligatory 40 hours			
Teaching	AGH	20	
Statistics	IFJ/AGH	20	
Modern programming languages	IFJ/AGH	20	
Mathematics in computers: Matlab, Mathematica and other	IFJ/AGH	20	
Interdisciplinary module – obligatory 2 lectures from outside of the discipline, 40 hours			
Interdisciplinary aspects of physics	IFJ/AGH	20	
Interdisciplinary aspects of chemistry	IKiFP	20	
Modern-age diseases	IF	20	
Interdisciplinary aspects of materials engineering	IMIM/AGH	20	
Specialist module – obligatory 2-4 lectures within the discipline, 60 hours			
Discipline of physical sciences: proposed topics	IFJ/AGH		
Mathematics as a tool for physics		30	
Elements of quantum mechanics		30	
Quantum mechanics of many-body systems		30	
<i>Ab initio</i> methods in quantum computing		30	
Spectroscopic methods in interdisciplinary research		20	
Interaction of ionizing radiation with matter		20	
Theory and experiment in high-energy physics		30	
Energy – a challenge for modern civilization		20	
Physical basis of CT scan, NMR scan etc.		20	
Elements of biophysics		30	

Nonlinear dynamics		30	
Electronic properties of condensed matter		30	
Discipline of chemical sciences: examples of topics	IKiFP		
Physicochemistry of surface and dispersed systems		30	
Modern methods of physicochemical research I-II		35	
Physical basis of the structure of matter		15	
Colloidal systems in the context of modern nanotechnology development		15	
Theoretical and experimental biocatalysis		15	
Catalyst design for key industrial and environmental processes		15	
Computational methods for interphase systems of high innovative potential		15	
Discipline of medical sciences: examples of topics	IF		
Pharmacology of modern-age diseases		15	
Genetic models in experimental research		15	
Biomechanics of the brain	IF/IFJ	15	
Statistics in biomedical research		15	
Discipline of materials engineering: examples of topics	IMIM	30	
Scanning and transmission electron microscopy		30	
Chemical thermodynamics, thermal analysis and differential calorimetry		30	
Functional and structural materials and their thermomechanical treatment		30	
Diffusional phase transitions and their structural effects		30	
X-ray diffraction as a tool for structural characterization of materials		30	
Processes generated by targeted energy techniques		30	

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Introduction to composite and functional materials engineering	AGH	30	
Biomaterials and medical devices engineering		30	
Machine learning techniques in data exploration		30	
Advanced materials research methods		30	