

**CURRICULUM OF THE DOCTORAL STUDIES  
OF THE INSTITUTE OF GEOPHYSICS  
OF THE POLISH ACADEMY OF SCIENCES (PAN)**

- 1) The doctoral studies at the Institute of Geophysics of the Polish Academy of Sciences (IGF PAN) are conducted in the form of individual full-time studies under the supervision of an academic tutor who is a senior academic faculty member. In justified cases, the head of the doctoral studies may appoint an ancillary tutor – an academic faculty member of the Institute of Geophysics of PAN holding the doctoral degree. This person can be appointed ancillary supervisor from the moment a doctoral student commences his/her doctoral degree programme.
- 2) A student admitted to studies is assigned to a given faculty. The speciality of the research conducted within a given Faculty of IGF PAN, to which a doctoral student has been admitted, is treated as his/her research speciality.
- 3) The academic tutor establishes the subject of the research and the scope of the doctoral dissertation with the doctoral student.
- 4) The classes for doctoral students encompass at least 520 hours fulfilled within the framework of subjects, as well as indoor classes and field classes within the period of 4 years (8 semesters). These classes consist of the general subjects, major subjects and classes developing the teaching and professional skills, including the abilities related to the methodology and methods of conducting scientific research. The subjects from the general and the teaching-professional groups are obligatory for all doctoral students. Moreover, a doctoral student is obliged to pass at least three major subjects over the entire course of the studies, as well as to establish a schedule of classes for the subsequent year in agreement with the head of the doctoral studies.
- 5) The total number of ECTS points encompassed by the curriculum and required for the completion of the doctoral studies is not lower than 30 points.
- 6) General subjects required to get a credit:
  - a) *Issues in the contemporary geophysics* (45 hours – 3 ECTS)  
Way of crediting: exam  
*Educational effect: Gaining knowledge and understanding of the basic physical processes occurring in the Earth's interior, on its surface, in the oceans and rivers as well as in the atmosphere, becoming familiar with the composition and structure of the Earth and its atmosphere, becoming acquainted with the contemporary research trends and methods in the individual branches of geophysics.*
  - b) *Statistical methods in geophysics* (45 hours – 3 ECTS)  
Way of crediting: exam  
*Educational effect: Becoming acquainted with the statistical methods applied in various branches of geophysics, the identification of the multi-dimensional geophysical processes and the estimation of the parameters of their statistical distributions in the conditions of non-stationary and heterogeneous character, the method of highest reliability, the confidence estimation, the significance test and*

*the compliance test, etc., becoming familiar with the detailed principles and methods of using an error account in various types of experimental works and numerical simulations.*

- c) *Mathematic modelling in geophysics* (45 hours – 3 ECTS)  
Way of crediting: credit

*Educational effect: Becoming acquainted with the theory and methods of solving ordinary and partial differential equations (the trajectory method, the elliptical, parabolic and hyperbolic equations, etc.), as well as differential equations, becoming acquainted with the fundamentals of dynamic system analysis, the methods of analysing stochastic processes, as well as time series.*

- d) *IT tools in geophysics* (45 hours – 3 ECTS)  
Way of crediting: credit

*Educational effect: Becoming acquainted with the detailed catalogue of numerical methods used in Earth sciences, along with a precise description of their advantages and disadvantages as well as the scope of applicability (numerical methods of solving differential equations, minimisation methods, etc.), becoming familiar with the functionalities of the analysis packages such as MATLAB, MATHEMATICA, MAPLE, etc.*

- 7) Activities developing teaching and professional skills (way of crediting: credit):

- a) *Internship* (120 hours – 6 ECTS)
- b) *Doctoral seminar* (120 hours – 5 ECTS)
- c) *Teaching* (40 hours – 5 ECTS)

The doctoral seminar is held every semester.

- 8) The teaching required for the completion of the course of doctoral studies is fulfilled within the framework of:

- a) *The Project entitled Geophysics in School* (Geofizyka w Szkole)
- b) *The Polish National Fund for Children* (KFD)
- c) *Science Picnics*
- d) *Science Festivals*
- e) *Other teaching activities*

- 9) A student of doctoral studies is obliged to undertake an internship, which can be fulfilled within a framework of:

- a) *Short- or long-term apprenticeship in the Research Stations of the IGF PAN*
- b) *Short- or long-term stays abroad*
- c) *Field works within a framework of experiments conducted at the Facilities*
- d) *Internal apprenticeship at the IGF PAN*

The total number of hours required to successfully complete the internship by a doctoral student is equal to 120 hours.

- 10) Besides the general subjects and teaching-professional classes, doctoral students must also pass at least three major subjects, including at least two within their own speciality. The names of major subjects can be found in Appendix No. 1 to this Curriculum.
- 11) Major subjects are approved for the period of 1 year by the Scientific Council.
- 12) In justified cases, e.g. where it is necessary for the doctoral student to considerably broaden his/her knowledge, the student may participate in any specialist classes of his/her choice and agreed with the academic tutor and the head of the doctoral studies, which are conducted at other universities or research units.
- 13) The academic tutor is obliged to make a doctoral student familiar with the Code of Ethics for Researchers of the Committee on Ethics in Science.
- 14) Completion of a year.

Upon completion of each academic year, by September 15<sup>th</sup> the students are obliged to provide the head of studies with a report on the fulfilment of the dissertation and the course of the studies, along with the opinion of the academic tutor on the progress of the research work. Timely submission of the report is a necessary condition for admitting the doctoral student to a successive year of study.

- 15) A prerequisite for graduation from the doctoral studies is the fulfilment of the core curriculum and the completion of all the above-mentioned curriculum-related duties.

**Major subjects for the academic year 2014/2015  
fulfilled in groups or in cooperation with the academic tutor**

N O.	Name of course	Number of hours	ECTS points	Way of crediting (Exam - E, Credit - Z)
1	Modelling the structure of the lithosphere 1	30	3	Z
2	Modelling the structure of the lithosphere 2	30	3	Z
3	Basics of seismic imaging	30	3	Z
4	Structure of the lithosphere in the Central Europe, the Arctic and the West Antarctica in the light of the findings of the Polish active seismic experiments	5	1	Z
5	Environmental hydraulics 1	30	3	Z
6	Environmental hydraulics 2	30	3	Z
7	Modelling the hydrological processes 1	30	3	E
8	Modelling the hydrological processes 2	30	3	E
9	Statistical methods in hydrology	30	3	Z
10	Paleomagnetism	15	2	Z
11	Environmental magnetism and mathematic methods of examining rocks and soils	15	2	Z
12	Earth's magnetic dynamo	30	3	Z
13	Electromagnetic probing	30	3	Z
14	Elements of the contemporary inversion theory	30	3	Z
15	Introduction to complex system modelling	15	2	Z
16	Optical methods of environmental research	30	3	E
17	Application of selected geophysical methods in polar research	15	2	Z
18	Methodology of scientific research	15	2	Z
19	English language course	60	1	Z