



FACULTY OF MATHEMATICS, PHYSICS AND TECHNICAL SCIENCES

INSTITUTE OF MATHEMATICS

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MATHEMATICS

STUDY PROGRAM

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MAJOR DESCRIPTION – MATHEMATICS

Institute of Mathematics, a unit of Faculty of Mathematics, Physics and Technical Science, has prepared a broad MATHEMATICS major covering both classical and new results of a worldwide range of research. Our scientist focus mainly on Real Functions, Algebra and Number Theory, Topology and Theory of Integrals, but the study programs contain all subjects recommended as necessary to regard our graduated as mathematicians.

In order to live up to all expectations, including the best teaching quality and hope of a prosperous employability, we have created the major with variety of specialities. There is the common core of all programs consisting of several subjects related to different mathematical areas. Specialized subjects refer to Informatics, Cryptology, Finance and Insurance, Teaching. Such a division allows us to train specialist who are able to work creatively for banking, finance companies, public security units as well as to teach at schools of each educational level.

Students are taught with various methods. Lectures are often supported with a slideshow and the multimedia presentation are usually available to students. This form of activities include 50% of all hours that students have to spend at the university. We also carry on seminars, computer laboratories and practical exercises. Those sorts of classes are obligatory. To achieve a positive grade and ECTS credits students are assessed during oral or written tests or exams (maximally 4 per one examination session).

Students are obliged to undertake teaching or vocational practice accordingly to the study profile.

Students attend most of lectures, seminars and laboratories in a monumental building of Institute of Mathematics where there are three computer laboratories, multimedia auditorium and a library. Thanks to that students can join their regular study classes and their individual learning activity, such as consulting teachers, searching for literature, collecting data from Internet (there is a free wireless access to the Net within the building and courtyard).

Due to requirements of Bologna Process there are two levels of studies:

Bachelor of Science (with speciality of Informatics, Cryptology, Teaching Mathematics and ICT),

Master of Science (with speciality of Teaching Informatics, Finance and Insurance).

Candidates for the first level (BSc) should pose Maturity certificate and a proof of good knowledge of English. The level lasts three years. Students collect 180 ECTS credits (60 per each study year).

Students willing to become teachers of Mathematics and ICT have to declare the specialisation while applying for the Bachelor degree studies. Students of the two others specialisations have to choose one of them after the first year of studies.

Candidates for the second level (MSc) should have achieved Bachelor's degree in Mathematics or related area, as well as a proof of advanced English. That level lasts two years. Student collect 120 ECTS credits (60 per each study year). While applying for the studies students choose one of two specialisations: Teaching Informatics or Finance and Insurance.

STUDENTS RESEARCHES GROUPS

Active students are welcome to the research group called OMEGA. Its main goal is to improve teaching competences within areas of Mathematics, ICT and Informatics, discovering new teaching methods, supporting teaching with computer and other multimedia. We work with students of lower and upper secondary school, take part in annual scientific camps, organize mathematical and algorithmic competitions. Our students may also lead their mathematical research, attend conferences and seminars both Polish and international. The exact activities of students working with OMEGA group depend on their interest.

INTERNATIONAL STUDENT EXCHANGE PROGRAMS

Institute of Mathematics benefits from educational Long Life Learning Programmes such as Erasmus or Leonardo da Vinci II. Academic, social, professional and cultural integration are the main goals of the students exchange.

We encourage students to accomplish a part of their studies at any partner university in Europe and enable students to acquire professional competence in the course of studies through European placement opportunities. We promote student professional mobility among local enterprises.

In compliance with idea of Erasmus students may spend one or two semesters studying at any partner university. The rule refers to all students of the University, what means that foreign students can take part at the exchange, too. Institute of Mathematics partner universities are located in Hungary, Italy, Slovakia, Greece and Turkey. We guarantee recognition of achievements accorded with a student's study plan. Other subject would be recognized as additional and described in a diploma supplement.

PROGRAMS DESCRIPTION. DESCRIPTION OF GRADUATES

First level specialities

Education

Graduates should possess general and comprehensive knowledge of Mathematics, Computer Science and Didactics of Mathematics and ICT.

General education subjects: Foreign languages, Philosophy, Physics.

Basic subjects (Mathematics): Logic and Set Theory, Mathematical Analysis, Linear Algebra, Complex Analysis, Topology, Probability and Statistics, Ordinary Differential Equations.

Other subjects (Informatics): Operating systems, Computer Network, Programming, Algorithms, Databases.

Other subjects (education): Psychology, Pedagogy, Didactics of Mathematics, Didactics of ICT.

Courses are conducted as lectures, tutorials, seminars or practical exercises in laboratories. A teacher training at school is a part of the study.

Graduates of the 1st level studies are awarded with the BSc. title. They receive basic knowledge and skills in theoretical and applied Mathematics and Informatics. All their qualifications are listed in education standards for mathematical studies. They will be able to work mainly as mathematics and ICT teachers in schools, but also in various institutions (banking, finance, insurance, administration, consulting).

In particular, they may:

- make use of abstract thinking;
- be prepared to self-teaching;
- be qualified for entering second level studies;
- work at any position requiring knowledge of Mathematics and Informatics;
- be eligible to teach Mathematics at the primary and lower secondary level of education.

Potential employers.

- schools and other educational institutions,
- research and development centres,
- education-related centres.

First level specialities

Informatics

Graduates should possess general and comprehensive knowledge of Mathematics and Computer Science. The specialization has to be chosen after the first year of study.

Basic subjects (mathematics): Logic and set theory, Mathematical Analysis, Linear algebra, Complex Analysis, Topology, Probability and Statistics, Ordinary Differential Equations.

Specialization subjects (informatics): Operating systems, Computer Network, Programming, Algorithms, Databases.

General education subjects: Foreign languages, Philosophy, Physics.

Courses are conducted as lectures, tutorial or practical exercises in laboratories. A vocational training is a part of the study.

Graduates of the 1st level studies are awarded with the BSc. title. They receive basic knowledge and skills in theoretical and applied mathematics and computer science. All their qualifications are listed in education standards for mathematical studies. Students will be able to work in various financial and public safety institutions (as banking, insurance, police, army), and any other enterprises using methods of Mathematics and Computer Science (e.g. consulting companies, small and medium enterprises, public administration, European Union structures).

In particular, they may:

- make use of abstract thinking,
- be prepared to self-teaching,
- be qualified for entering second level studies,
- work at any position requiring knowledge of theoretical and/or applied mathematics and/or computer science,
- be eligible to teach mathematics and/or computer science at the elementary level of education (assuming the education standards are fulfilled additionally).

Potential employers:

- research and development centres,
- education-related centres,
- companies using mathematical know-how (e.g. banks, insurance companies),
- schools (elementary level) - with the above assumption.

First level specialities

Cryptology

Graduates should possess general and comprehensive knowledge of Mathematics, Computer Science and Cryptology. The specialization should be chosen after the first year of study.

Basic subjects (mathematics): Logic and Set Theory, Mathematical Analysis, Linear Algebra, Complex Analysis, Topology, Probability and Statistics, Ordinary Differential Equations.

Specialization subjects (informatics): Operating systems, Computer Network, Programming, Algorithms, Databases.

Specialization subjects (cryptology): Elementary and Algorithmic Number Theory, Discrete Mathematics, Theory of Information, Cryptographic Algorithms and Cryptographic Systems.

Courses are conducted as lectures, tutorial or practical exercises in laboratories. A vocational training is a part of the study.

Graduates of the 1st level studies are awarded with the BSc. title. They receive basic knowledge and skills in theoretical and applied Mathematics and Cryptology. All their qualifications are listed in education standards for mathematical studies. Students will be able to work in various financial and public safety institutions (as banking, insurance, police, army), and any other enterprises using methods of Mathematics, Computer Science and Cryptology (e.g. consulting companies, small and medium enterprises, public administration, European Union structures). After meeting some additional requirements they can also become a Computer Science teacher.

In particular, they may:

- make use of abstract thinking;
- be prepared to self-teaching;
- be qualified for entering second level studies;
- work at any position requiring knowledge of Mathematics and/or Cryptology;
- be eligible to teach mathematics at the elementary level of education (assuming the education standards are fulfilled in the course).

Potential employers:

- research and development centres,
- education-related centres,
- any institution related to encrypting information, e.g.
 - public security (police, army, intelligence),
 - finance (banks, insurance companies),
 - other business making use of personal data (e.g., mobile companies),
- schools (elementary level) - with the above assumption.

Second level specialities

Teaching Informatics

Graduates should possess deepened knowledge of Mathematics, Computer Science and Didactics of Informatics. The study is focused on forming analytical thinking, communication skills, ability of cooperating in groups.

General mathematics education subjects: English in Mathematics, History of Mathematics, Applied Mathematics, Elementary Mathematics from an Academic Point of View.

Basic subjects (mathematics): Functional Analysis, Real Analysis, Complex Analysis, Galois Theory, Algebra, Topology, Differential Equations.

Specialization subjects (Informatics): Modelling and Analysis of Informatics Systems, ICT in Mathematics.

Specialization subjects (Education): Psychology, Pedagogy, Didactics of Mathematics, Didactics of Computer science.

Courses are conducted as lectures, tutorial or practical exercises in laboratories. A teacher training at school is a part of the study.

Graduates will be able to work as upper secondary school teachers, employees of domestic and international institutions (banking, finance, insurance, administration, consulting).

Potential employers:

- schools (all levels) and universities,
- research and development centres,
- education-related centres,
- companies using mathematical know-how (e.g. banks, insurance companies).

Second level specialities

Finance and Insurance

Graduates should possess deepened knowledge about Mathematics, Finance and Insurance. The study is focused on forming analytical thinking, communication skills, ability of cooperating in groups. Graduates will be able to work in domestic and international institutions (banking, finance, insurance, administration, consulting).

Basic subjects (mathematics): Functional Analysis, Real Analysis, Complex Analysis, Galois Theory, Algebra, Topology, Differential Equations.

Specialization subjects: Probability and Descriptive Statistics in Economy, Finance Mathematics, Insurance Mathematics, Mathematical Theory of Securities Portfolio, Introduction to the Theory of Investment and Finance.

Courses are conducted as lectures, tutorial or practical exercises in laboratories. A vocational training at school is a part of the study.

Graduates of the 2nd level studies are awarded with the MSc. title. They receive all basic knowledge and skills in theoretical and applied Mathematics (especially in applications to Finance and Insurance), and in related fields (e.g. Statistics). All their qualifications are listed in education standards for mathematical studies.

Graduates will be able to work in domestic and international institutions (banking, finance, insurance, administration, consulting). In particular, they:

- are prepared to self-teaching,
- are eligible to teach mathematics at all levels of education (assuming the education standards are fulfilled additionally),
- can work at any position requiring data mining,
- are prepared to specialize themselves in any field that makes use of applied Mathematics, especially Finance and Insurance,
- are qualified for entering PhD studies,
- have a potential for doing research in Mathematics and related fields.

Potential employers:

- research and development centres,
- education-related centres,
- companies using mathematical know-how (e.g. banks, insurance companies),
- schools (all levels) and universities - with the above assumption.

STUDY PLANS

First level specialities

Education

First level specialities

Informatics

First level specialities

Cryptology

Second level specialities

Teaching ICT

Second level specialities

Finance and Insurance

SUBJECTS DESCRIPTION