## Study plan

## Name of study plan: Nanotechnology

Faculty/Institute/Others:

Department:

Branch of study guaranteed by the department: Welcome page

Garantor of the study branch:

Program of study: Biomedical and Clinical Informatics

Type of study: Follow-up master full-time

Required credits: 120 Elective courses credits: 0 Sum of credits in the plan: 120

Note on the plan:

Name of the block: Compulsory courses Minimal number of credits of the block: 120

The role of the block: Z

Code of the group: F7NNT POV 21

Name of the group: Nanotechnology compulsory course

Requirement credits in the group: In this group you have to gain 120 credits

Requirement courses in the group: In this group you have to complete 29 courses

Credits in the group: 120

Note on the group:

Code	Name of the course / Name of the group of courses (in case of groups of courses the list of codes of their members)  Tutors, authors and guarantors (gar.)	Completion	Credits	Scope	Semester	Role
F7PMIARVD	Analysis and Recognition of Multidimensional Data Olga Št pánková Olga Št pánková (Gar.)	Z,ZK	4	2P+2C	L	Z
F7PMIAS1	Signal Analysis I. Jan Hejda, Michal Huptych, Václav Gerla, Jan Kauler Jan Kauler Václav Gerla (Gar.)	Z,ZK	4	2P+2C	Z	Z
F7PMIAS2	Signal Analysis II. Jan Hejda, Michal Huptych, Václav Gerla, Kamila Lepková <b>Jan Hejda</b>	Z,ZK	4	2P+2C	L	Z
F7PMIANM-N	Application of Nanomaterials in Medicine Vladimíra Petráková, Václav Petrák Vladimíra Petráková Vladimíra Petráková (Gar.)	Z,ZK	5	2P+2C	Z	Z
17BOZP	Occupational Safety and Health, Fire Protection and First Aid Petr Kudrna Petr Kudrna (Gar.)	Z	0	1P	Z	Z
F7PMIBD	Big Data Lenka Lhotská, Bohuslav Dvorský Lenka Lhotská Lenka Lhotská (Gar.)	Z,ZK	4	2P+2C	Z	Z
F7PMIBSB	Biological Signals and Biometrics Jan Kauler, Lenka Lhotská, Vladimír Kraj a <b>Jan Kauler</b> Vladimír Kraj a (Gar.)	Z,ZK	2	1P+1C	L	Z
F7PMIBAB-N	Biocompatible Materials  Martin Otáhal, Petr Písa ík, Jan Mikšovský, Jan Remsa Petr Písa ík Petr  Písa ík (Gar.)	KZ	3	2P	L	Z
F7PMIBST	Biostatistics Vojt ch Kamenský, Aleš Tichopád Vojt ch Kamenský Aleš Tichopád (Gar.)	Z,ZK	4	2P+2C	Z	Z
F7PMIBMD-N	Cellular and Molecular Diagnostics Veronika Vym talová Veronika Vym talová (Gar.)	Z,ZK	3	2P+2L	L	Z
F7PMIDWT	Database and Web Technologies Jan Hejda, Bohuslav Dvorský Bohuslav Dvorský (Gar.)	Z,ZK	4	2P+2C	L	Z
F7PMIDP1	Diploma Thesis I. Vladimíra Petráková, Zoltán Szabó, Jaroslav Tint ra, Radim Krupi ka, Jan Broulím <b>Radim Krupi ka</b> Radim Krupi ka (Gar.)	KZ	8	28	Z	Z
F7PMIDP2	Diploma Thesis II. Vladimíra Petráková, Zoltán Szabó, Jaroslav Tint ra, Radim Krupi ka, Jan Broulím <b>Zoltán Szabó</b> Zoltán Szabó (Gar.)	Z	14	28	L	Z
F7PMIFS-N	Fluorescent Spectroscopy Eva Urbánková Eva Urbánková (Gar.)	KZ	2	3P	L	Z
F7PMILAM-N	Lasers and their Application in Medicine Marie Pospíšilová Marie Pospíšilová (Gar.)	KZ	2	2P+2C	L	Z

F7PMILEG	Legislation and Safety of Biomedical Software and Data Lenka Lhotská, Dagmar Brechlerová Dagmar Brechlerová (Gar.)  Brechlerová (Gar.)	ZK	2	2P	Z	Z
F7PMIMLB-N	Molecular Biology Veronika Vym talová Veronika Vym talová (Gar.)	ZK	2	2C	Z	Z
F7PMINNI-N	Nanoinformatics Lenka Lhotská Lenka Lhotská Lenka Lhotská (Gar.)	KZ	4	2P+2C	L	Z
F7PMINAN-N	Nanotechnology and Nanomaterials Vladimíra Petráková, Václav Petrák Vladimíra Petráková Vladimíra Petráková (Gar.)	Z,ZK	5	4P+2C	L	Z
F7PMINUR	Design of User Interfaces Zden k Mikovec Zden k Mikovec (Gar.)	Z,ZK	2	1P+1C	Z	Z
F7PMIOOP	Object-Oriented Programming Bohuslav Dvorský, Radim Krupi ka, Tomáš Kraj a Radim Krupi ka Radim Krupi ka (Gar.)	Z,ZK	3	1P+2C	Z	Z
F7PMIPLB-N	Solids for Biomedicine Milan Ši or Milan Ši or Milan Ši or (Gar.)	Z,ZK	3	2P+1C	Z	Z
F7PMIPAZ	Advanced Algorithms  Jan Broulim, Pavel Smr ka Pavel Smr ka (Gar.)	Z,ZK	5	2P+2C	Z	Z
F7PMIPBF-N	Biophotonics Petr Písa ík, Jan Mikšovský, Jan Remsa Petr Písa ík Jan Mikšovský (Gar.)	Z,ZK	4	2P+2C	Z	Z
F7PMIRAST	Robotics and Assistive Technology  Jan Kauler, Václav Hlavá Jan Kauler	Z,ZK	5	2P+2C	L	Z
F7PMIRPJ1	Year Project I. Václav Gerla, Vladimíra Petráková, Aleš Tichopád, Veronika Vym talová, Zoltán Szabó, Radim Krupi ka, Pavel Smr ka, Ond ej Klempí, Hana Kalábová, Radim Krupi ka Radim Krupi ka (Gar.)	KZ	8	28	Z	Z
F7PMIRPJ2	Year Project II. Václav Gerla, Vladimíra Petráková, Václav Petrák, Aleš Tichopád, Veronika Vym talová, Zoltán Szabó, Radim Krupi ka, Pavel Smr ka, Ond ej Klempí, Zoltán Szabó	KZ	8	28	L	Z
F7PMISKJ	Scripting Languages Ond ej Klempí Radim Krupi ka Radim Krupi ka (Gar.)	KZ	2	2C	Z	Z
F7PMIUMIT	Artificial Intelligence Olga Št pánková, Martin Macaš Martin Macaš Olga Št pánková (Gar.)	Z,ZK	4	2P+2C	Z	Z

Analysis and Recognition of Multidimensional Data	Z,ZK	4
Signal Analysis I.	Z,ZK	4
Signal Analysis II.	Z,ZK	4
Application of Nanomaterials in Medicine	Z,ZK	5
Occupational Safety and Health, Fire Protection and First Aid	Z	0
Big Data	Z,ZK	4
Biological Signals and Biometrics	Z,ZK	2
Biocompatible Materials	KZ	3
Biostatistics	Z,ZK	4
Cellular and Molecular Diagnostics	Z,ZK	3
information regarding basic diagnostic methods used in cell biology with particular focus on laboratory training.	•	•
Database and Web Technologies	Z,ZK	4
Diploma Thesis I.	KZ	8
Diploma Thesis II.	Z	14
Fluorescent Spectroscopy	KZ	2
Lasers and their Application in Medicine	KZ	2
	Signal Analysis I.  Signal Analysis II.  Application of Nanomaterials in Medicine Occupational Safety and Health, Fire Protection and First Aid Big Data Biological Signals and Biometrics Biocompatible Materials Biostatistics Cellular and Molecular Diagnostics information regarding basic diagnostic methods used in cell biology with particular focus on laboratory training. Database and Web Technologies Diploma Thesis I. Diploma Thesis II. Fluorescent Spectroscopy Lasers and their Application in Medicine	Signal Analysis I.  Signal Analysis II.  Application of Nanomaterials in Medicine  Occupational Safety and Health, Fire Protection and First Aid  Big Data  Biological Signals and Biometrics  Biocompatible Materials  KZ  Biostatistics  Cellular and Molecular Diagnostics  information regarding basic diagnostic methods used in cell biology with particular focus on laboratory training.  Database and Web Technologies  Diploma Thesis I.  Fluorescent Spectroscopy  KZ

In the course, the student will learn about the use of laser radiation in medical applications for diagnosis and treatment. In the introductory lectures, they will learn about the principle of the laser, its main parts and parameters. An overview of laser systems and their use in medicine will be given. He will acquire basic knowledge about the interaction of laser radiation with tissue, their division into primary and secondary factors. At the end, they will be introduced to specific applications of lasers in medicine. Keywords: laser, laser diagnosis, laser treatment, interaction laser beam with tissue

F7PMILEG	Legislation and Safety of Biomedical Software and Data	ZK	2
F7PMIMI B-N	Molecular Biology	7K	2

Structure and function of nucleic acids DNA and RNA. Replication, transcription, translation. Protein synthesis, prokaryotic and eukaryotic gene expression. Structure and function of proteins. Enzymes. Reproduction of cells, cell cycle, cell division. Biotechnology, hybridoma technology. Recombinant DNA vectors, restriction enzymes. Changes in genetic information, mutation. Methods of molecular biology - DNA isolation, centrifugation, electrophoresis, PCR. Flow cytometry. Genetic manipulation - genetic engineering, gene modification, gene splicing.

F7PMINNI-N Nanoinformatics ΚZ

he aim of the Nanoinformatics course is to introduce to students the areae of nanomaterials and nanostructures and data collection in this environment. Follow-up lectures will introduce students to the issue of data representation and information about materials, structures and properties, data sources, more complex forms of representation in the form of ontologies. Further lectures will focus on machine learning methods applicable to data from the nanoworld. At the end, students will get information about the latest trends in nanoinformatics.

F7PMINAN-N	Nanotechnology and Nanomaterials	Z,ZK	5
F7PMINUR	Design of User Interfaces	Z,ZK	2
F7PMIOOP	Object-Oriented Programming	Z,ZK	3
F7PMIPLB-N	Solids for Biomedicine	Z,ZK	3

Solid state physics is very wide line of physics with many application, topics of lectures: structure of solid states, bindings, mechanical properties, specific heat, electrical properties, superconductivity, bands theory, physics of semiconductors, optical properties of solid states, luminescence, liquid crystals, application at biomedical engineering.

ı	F/PIVIIPAZ	Advanced Algorithms	∠,∠ <b>r</b> \	5

F7PMIPBF-N	Biophotonics	Z,ZK	4
Overview of principles a	and applications in interdisciplinary region connecting disciplines of physics, optics and biology. Interaction of optical radiation	with matter, with	tissue, basics of
biology, photobiology, b	ioimaging, microscopy, basics of lasers, laser safety, optical biosensors, nanotechnology for biophotonics.		
F7PMIRAST	Robotics and Assistive Technology	Z,ZK	5
F7PMIRPJ1	Year Project I.	KZ	8
F7PMIRPJ2	Year Project II.	KZ	8
F7PMISKJ	Scripting Languages	KZ	2
F7PMIUMIT	Artificial Intelligence	Z,ZK	4

## List of courses of this pass:

Code	Name of the course	Completion	Credits
17BOZP	Occupational Safety and Health, Fire Protection and First Aid	Z	0
F7PMIANM-N	Application of Nanomaterials in Medicine	Z,ZK	5
F7PMIARVD	Analysis and Recognition of Multidimensional Data	Z,ZK	4
F7PMIAS1	Signal Analysis I.	Z,ZK	4
F7PMIAS2	Signal Analysis II.	Z,ZK	4
F7PMIBAB-N	Biocompatible Materials	KZ	3
F7PMIBD	Big Data	Z,ZK	4
F7PMIBMD-N	Cellular and Molecular Diagnostics  The students will obtain information regarding basic diagnostic methods used in cell biology with particular focus on laborator	Z,ZK	3
F7PMIBSB	Biological Signals and Biometrics	Z,ZK	2
F7PMIBST	Biostatistics	Z,ZK	4
F7PMIDP1	Diploma Thesis I.	KZ	8
F7PMIDP2	Diploma Thesis II.	Z	14
F7PMIDWT	Database and Web Technologies	Z,ZK	4
F7PMIFS-N	Fluorescent Spectroscopy	KZ	2
of the laser, its main par	Lasers and their Application in Medicine ent will learn about the use of laser radiation in medical applications for diagnosis and treatment. In the introductory lectures, the sand parameters. An overview of laser systems and their use in medicine will be given. He will acquire basic knowledge about on into primary and secondary factors. At the end, they will be introduced to specific applications of lasers in medicine. Keywo treatment, interaction laser beam with tissue	it the interaction of la	ser radiation
F7PMILEG	Legislation and Safety of Biomedical Software and Data	ZK	2
F7PMIMLB-N	Molecular Biology	ZK	2
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Structure and function of proteins. Enzymes. Rep	of nucleic acids DNA and RNA. Replication, transcription, translation. Protein synthesis, prokaryotic and eukaryotic gene expr roduction of cells, cell cycle, cell division. Biotechnology, hybridoma technology. Recombinant DNA vectors, restriction enzymes molecular biology - DNA isolation, centrifugation, electrophoresis, PCR. Flow cytometry. Genetic manipulation - genetic engine	ession. Structure and c. Changes in genetic	function of information,
Structure and function of proteins. Enzymes. Reputation. Methods of r	of nucleic acids DNA and RNA. Replication, transcription, translation. Protein synthesis, prokaryotic and eukaryotic gene expr roduction of cells, cell cycle, cell division. Biotechnology, hybridoma technology. Recombinant DNA vectors, restriction enzymes molecular biology - DNA isolation, centrifugation, electrophoresis, PCR. Flow cytometry. Genetic manipulation - genetic engine splicing.	ession. Structure and s. Changes in genetic eering, gene modifica	I function of information, ation, gene
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