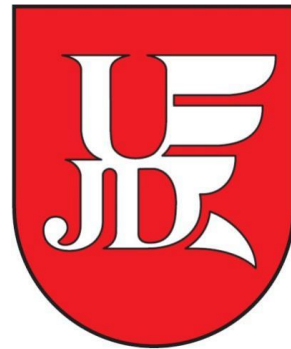# Jan Dlugosz University
in Czestochowa

Courses taught in English
for exchange students
at the Faculty of Science & Technology,
Winter semester, academic year 2023/24

Dietetics, Human nutrition & dietetics

Course title	ECTS	Hours	Form	Semester Winter	Course description
The basics of chemistry dr hab. inż. Iwona Zawierucha, prof. UJD, mgr Damian Kulawik	2	40	laboratory	Winter	During this course, the student acquires skills useful for independent laboratory work, i.e. carrying out the correct observation of the chemical processes and describing their results, interpreting and drawing conclusions, independently designing and performing experiments - through the ability to select appropriate equipment, reagents and use various sources of information.
Parasitology dr Dariusz Świerczewski	1	15	laboratory	Winter	The aim of the course is to introduce students to the field of parasitology. The laboratory is based on microscopic (slides) and macroscopic (wet specimens) observations and making drawings of parasites of medical and veterinary importance belonging to such groups as protists, flukes, tapeworms, roundworms, parasitic insects and arachnids. For each observed parasite a short characteristic will be provided including: definitive/intermediate hosts, vector, invasive form, transmission mode, location within host and disease caused.
Molecular biology and genetics dr Katarzyna Bandurska	1	10	lecture	Winter	The aim of the lecture is to acquire basic knowledge about the structure and functioning of a eukaryotic cell as well as to learn and understand the basics of genetics: the mechanisms of inheritance, DNA structure and organization of the human genome, transcription and translation, regulation of gene expression.
General and food microbiology dr Magdalena Marczak	3	55	laboratory	Winter	Principles of work in a microbiological laboratory, basic microbiological testing techniques, microbiological media, methods of sterilization and disinfection.

					Technique of microscopy and preparation for survival preparations, simple staining of bacteria. Grammy staining of morphological forms of bacteria. Methods of staining bacteria. Structures of bacterial cells. The influence of physical and chemical factors on microorganisms, methods of inoculating liquid media, surface culture. Study of biochemical properties microorganisms, redox enzymes, reduction cultures. Dairy microbiology, probiotic bacteria, fermentation. Microbiology of plant materials. Spice microbiology. Microbiology of meat products. Enterobacteriaceae, Staphylococcus and others, food poisoning.
Analysis and evaluation of food quality prof. dr hab. Lesław Juszczak	1	15	lecture	Winter	The aim of the course is to provide students with knowledge of the basic principles and methods of food analysis and quality evaluation. Topics of lectures include the basic methods used in the evaluation and analysis of food quality, rules for collecting and preparing samples for analysis, and the possibility of errors. In addition, lectures include: determination of water, protein, sugars, polysaccharides and fiber, qualitative and quantitative assessment of food fats, determination of vitamins, ash, minerals and selected food additives. The topic of the course is complemented by sensory analysis in food quality evaluation.
Food safety and hygiene prof. dr hab. Danuta Kołożyn-Krajewska	1	15	lecture	Winter	The aim of the course is to familiarize students with the issues of food hygiene understood as the creation of conditions for the production of quality care, which is mostly safe from the point of view of consumer health.

Basics of sensory analysis dr Kamila Kapuśniak, mgr Malwina Wójcik	1 + 4	10 + 40	lecture + workshop	Winter	The senses as a stimulator of behavior. Receptors and substances generating particular taste and smell sensations. Evaluation of the efficiency of human senses and the causes of different sensory efficiency. Conditions necessary for accurate and repeatable results of sensory evaluations. Types and systematics of methods used in sensory research. Sensory sensitivity test. Differential methods. Methods using scales and categories. Application of descriptive methods in assessing the quality of food products. Sensory consumer research – qualitative and quantitative methods. Experiment planning and presentation of results in sensory research. Determination of color parameters using a colorimeter.
Physiology of human nutrition dr Agnieszka Berdowska	1	15	lecture	Winter	Body weight and body composition. Distribution of water and electrolytes. Water balance regulation. Regulation of electrolyte balance - sodium, potassium, calcium, phosphorus and chlorine. Regulation of fluid volume in the extracellular and interstitial space. Acid-base economy. Minerals and their importance in nutrition. Trace elements, vitamins - importance, demand. Human metabolism and modulating factors. Obtaining energy from food. Control of the energy released by cells. Nervous and hormonal regulation of metabolic changes. Digestion and absorption of carbohydrates - characteristics, sources, metabolism, demand. Dietary fiber and its role. Digestion, absorption and metabolism of fats. Protein digestion and absorption - characteristics, sources, metabolism, demand.
Methodology and planning of the dietary research dr Agnieszka Rudzka	2	20	workshop	Winter	The course is focused on planning of the dietary research. Students learn how to design the plan of the study, including the design of research on human subjects, inclusion and exclusion criteria for studied population, methods of gathering and analyzing data from dietary research.

Biotechnology

Course title	ECTS	Hours	Form	Semester Winter	Course description
Biotechnology Biotechnologia dr Anna Nowik-Zając	3	30	laboratory	Winter	The aim of the course is to acquaint students with the possibilities of using the achievements of biotechnology in medicine, environmental protection, and agriculture. The issues of fermentation, bioproduct production, production of extracellular enzymes, degradation of petroleum compounds will be discussed.
Enzymology Enzymologia dr Magdalena Marczak	2	20	laboratory	Winter	Acquaint students with the theoretical and practical aspects of biocatalysis. Development of skills: isolation of enzymes, qualitative examination of selected enzymes, analysis of the influence of external factors on the course of an enzymatic reaction, determination of the speed of an enzymatic reaction.
Genetically modified organisms Organizmy genetycznie modyfikowane dr Katarzyna Bandurska	1 1	15 15	lecture conv.	Winter	The aim of the course is to familiarize students with the technology of obtaining genetically modified organisms, legal regulations related to them and the principles of using genetically modified organisms for research and economic purposes.
Bioprocess engineering Inżynieria bioprocesowa dr hab. Iwona Zawierucha, prof. UJD	1 1	15 15	lecture classes	Winter	Gaining basic knowledge in the field of bioreactors engineering and the principles of bioprocess-based technologies, including technical issues. Acquiring the ability to dimension and determine the basic parameters of the bioreactor as well as its operational work.
Genetic engineering Inżynieria genetyczna dr Katarzyna Bandurska	2	20	lecture	Winter	The aim of the course is to familiarize student with an overview of principles, techniques and tools used in genetic engineering and their modern applications in biotechnology field.

Chemistry

Course title	ECTS	Hours	Form	Semester Winter	Course description
Molecular targeted drugs Leki celowane molekularnie dr W. Woszczyk	3	15+15	lecture + exercises	Winter	This course has been specifically designed to present the latest and most spectacular approach to treatment as a strategy for defining the precise goal for medical action. Based on an in-depth analysis of the disease and current scientific and medical achievements, targeted molecular therapy provides tools and methods to combat diseases that until now have been very difficult, if not incurable, using traditional treatments.
Advanced organic synthesis in drug chemistry Zaawansowana synteza organiczna w chemii leków prof. dr hab. P. Bałczewski	5	30+30	lecture + exercises	Winter	1) A review of representatives of basic classes of drugs and the drugs recently introduced to the world markets, their step-by step synthesis including detailed reaction mechanisms and biological activity. 2) Drugs planning based on the principles of retrosynthetic analysis and an extended knowledge on chemical reactions that are not discussed in the basic course, including recently developed reactions that are fundamental for organic synthesis, e.g. metal catalyzed cross-coupling reactions.
Phytotherapy Fitoterapia dr W. Woszczyk	4	30+15	lecture + exercises	Winter	Phytotherapy is the use of plant based and plant-derived medications in treatment and prevention of disease. This course takes a modern approach to traditional herbalism by thorough scientific verification of practical use of plant based products

					intended for medical implementation in most common health conditions.
English terminology in medical chemistry Terminologia angielska w chemii medycznej dr hab. inż. Iwona Zawierucha, prof. UJD (po wybraniu przez studentów przy rekrutacji specjalności chemia leków)	2	15	exercises	Winter	Analysis of experimental work in English in the field of medical chemistry in terms of chemical terminology. Analysis of review works in English in the field of medical chemistry in terms of chemical terminology. Analysis of popular scientific papers in English in the field of medical chemistry.
Synthesis, isolation and identification of pharmacopoeial substances Synteza, izolacja i identyfikacja substancji farmakopealnych dr E. Różycka-Sokołowska/dr M. Turek (po wybraniu przez studentów przy rekrutacji specjalności chemia leków)	4	15+30	exersises + lab	Winter	Information on pharmacopoeial substances, drug synthesis, enzymes, receptors, absorption of pharmacopoeial substances, distribution, excretion, dosage. Information on drug research, leading compounds, structure and activity relationships, drug design. Methods of isolating pharmacopoeial substances. Methods of identifying pharmacopoeial substances. Laboratory: 1. Isolation of theobromine from cocoa (method A). 2. Isolation of theobromine from cocoa (method B). 3. Synthesis of diphenylhydantoin (phenytoin). 4. Synthesis of benzylideneacetophenone (chalcone). 5. Project - development of a procedure for the isolation of an active substance from a commercial pharmaceutical formulation.

History of exact and natural sciences Historia nauk ścisłych i przyrodniczych prof. dr hab. W. Marczak	3	20	exercises	Winter	The development of science as a civilization process; historical aspect of creating and developing exact and natural sciences; evolution of scientific theories on examples; outstanding creators of physics and chemistry, their research and discoveries, the significance of their research in the development of contemporary civilization; taking advantage of knowledge concerning exact and natural sciences in creating, functioning, and developing the economy; the mission of physics and chemistry in the contemporary world; physics and chemistry in light of the civilization challenges of the 21st century.
Organic chemistry II Chemia organiczna II prof. dr hab. J. Drabowicz	2	30	lecture	Winter	Lecture: Oxidation and reduction in organic chemistry Aromaticity: basic concepts Electrophilic substitution in aromatic derivatives (I) Electrophilic substitution in aromatic derivatives (II) Alcohols Ethers and Thioethers Carbonyl compounds: basic concepts Carbonyl compounds – Reactivity-I Carbonyl compounds – Reactivity-II Carbonyl compounds – Reactivity-III Carbonyl compounds – Reactivity-IV Aliphatic amines. Aromatic amines. Biomolecules.
Theoretical chemistry and molecular modelling Chemia teoretyczna i modelowanie molekularne	8	30+15+30	lecture + exercises + lab	Winter	Perturbation theory and variational principle; Single electron approximation, self-consistent field concept, Slater determinant, Paulie exclusion; Hartree-Fock-Roothaan method, closed- and open-shell systems. Functional base, types, significance, and

| dr P. Brągiel | | | | | principles of selection. Correlation energy. Møller-Plesset perturbation theory, Potential energy surface, geometry optimization. Molecular mechanics and dynamics – force field construction. Examples of force fields and results of MM calculations; Semi-empirical methods, their application and limitations; Density functional theory: Hohenberg-Kohn theorems, exchange and correlation functions – LDA, CGA, hybrid methods; overview of popular functions; Population analysis and its variants. Complex methods: G2, G3, CBS, Reaction path, Transition state theory (TST), intrinsic reaction coordinate; Molecule in a solution - SCRF methods; Qualitative models: AIMO theory, Fukui function, Woodward-Hoffman principles, Description of an oscillating spectrum in harmonic approximation; anharmonic corrections, Configuration interaction method. Description of the UVVis spectrum. Molecular distribution function, enthalpy, entropy, free enthalpy – determining from the results of calculations using quantum-chemical methods; Structures with translational symmetry. Calculation suites: Gausian03, Gamess, Crystal, Wien2K; Elements of group theory: a group and its representation, character of representation, Great Orthogonality Theorem and its consequences, projection operators. Applications: selection rules, reduced matrix elements; Time dependent perturbation theory; spontaneous and forced transitions, Einstein coefficients; Crystal field theory – determination of field parameters, ligand field theory. Molecular orbitals in the description of coordination structures. Jahn-Teller effect; Optical activity: polarization plane rotation, circular dichroism, Faraday effect |

Physics

Course title	ECTS	Hours	Form	Semester Winter	Course description
Thermodynamics Termodynamika Prof. dr. hab Shpotyuk Oleh	4	60	Lecture/Exercise	Winter	The course will include calculus exercises and discussion of problems in phenomenological thermodynamics and basic statistical physics. In addition, each student will present in the form of a multimedia presentation one problem of modern technology discussed on the basis of the principles of thermodynamics.
Physics with elements of calculus Fizyka z elementami rachunkowymi Dr Fuks-Janczarek Izabela	4	45	Exercise	Winter	Complementary knowledge of the basics of physics including: mechanics, waves in elastic media, sound waves, including knowledge necessary to understand basic physical phenomena occurring in nature on the extended high school level. Complementary knowledge of mathematics including: algebra, trigonometry, elements of statistics, mathematical methods necessary to describe and solve basic physical phenomena (basics of differential and integral calculus).

Physical Chemisty Chemia fizyczna Dr Piotr Brągiel	5	45	Lecture/Exercise	Winter	To acquaint students with the basic issues of physical chemistry describing the structure and properties of matter and the mechanism of physicochemical phenomena, necessary to analyse biotechnological processes.
Structure of Matter Budowa materii Prof. dr hab. Jacek Filipecki Dr Izabela Fuks Janczarek	5	60	Lecture/Exercise	Winter	The lecture deals with the description of models of atomic structure, atomic nucleus, elementary particles, spectroscopy of matter research and structure of matter.
Mathematical analysis Analiza matematyczna	7	90	Lecture/Exercise	Winter	Developing the ability to use concepts and tools in the field of mathematical analysis. Familiarization with the differential and integral calculus of functions of one variable
Computer simulation methods in solid state physics Metody symulacji komputerowych w fizyce ciała stałego Dr Dominik Szczęśniak	4	30	Laboratory	Winter	The course is aimed at mastering by the student the basic principles of designing and conducting computer simulations as well as quantum-chemical calculations of the physical properties of solids. The student should also master the ability to analyze the results of theoretical calculations and compare them with empirical data.
Computer typesetting in LaTex Komputerowy skład tekstu w LaTex-u Dr Renata Kawa	3	30	Laboratory	Winter	The aim of the laboratory is to familiarize students with the practical principles of computer typesetting in the LaTex system.

Safety Engineering

Course title	ECTS	Hours	Form	Semester Winter	Course description
Elements of the Reliability Theory **(Master Degree)** Elementy teorii niezawodności dr hab. Mikhail Selianinau, prof UJD	1	15	lecture	Winter	The tasks of the "Elements of Reliability Theory" discipline are to study the basic concepts of the theory of reliability of complex technical systems and their components, the mathematical basis of the reliability theory, qualitative and quantitative characteristics of reliability, factors that affect reliability. Practical methods for calculating reliability indices are also being considered.
Safety of Construction Infrastructure **(Master Degree)** Bezpieczeństwo infrastruktury budowlanej dr inż. Karolina Grabowska	2	30	workshop	Winter	The main aim of the course is familiarizing students with the classification of building objects based on current legal regulations. Moreover, students will learn the most important threats occurring in the buildings and the principles of ensuring the technical safety of the constructions.
Master's seminar **(Master Degree)** Seminarium magisterskie dr hab. Alina Gil, prof UJD	2	15	seminar	Winter	Classes prepare the student to submit the correct master's thesis and to publicly present the subject of the master's thesis with the use of multimedia equipment.

Information Technology Technologia informacyjna dr Rafał Głębocki	1	15	lab.	Winter	In the changing reality of the Network Society, Information Technology (IT) is of paramount significance. The IT course is a mixture of sociological and technological aspects of the contemporary digital world. From Marshall McLuhan (the world as a global village) to Ray Kurzweil (Artificial Intelligence). From the dawn of the Internet to Cloud Computing. The course aims to support students in mastering fundamental and practical IT notions that lead to success - both individually and in the professional environment.
Engineering Project II **(Master Degree)** Projekt inżynierski II prof. dr hab. inż. Jarosław Krzywański/ dr inż. Anna Żyłka	3	60	lab.	Winter	The course is conducted in a project form, requiring the student to prepare the solution to an engineering task along with its documentation and the presentation of the research results. The subject enables the student to understand issues related to engineering designing in the field of safety engineering (for example, noise protection, fire protection or anti-electrocution design, and the creation of safety and ergonomics procedures).The subject of the project is individually agreed with the student (according to his/her interests). It involves the designing and solving of an engineering problem in conformance with applicable regulations, i.e. EU directives and PN EN standards, with the use e.g., software programs (such as Inventor).
Mathematical decision support **(Master Degree)** Matematyczne wspomaganie decyzji Prof dr hab Yuriy Povstenko	2	30	lecture+ex.	Winter	Analysis of the decision-making process. Mathematical models of the decision-making process; Classes and methods of solving decision-making issues; Optimization issues. Conditional and unconditional optimization; Examples of optimization problems; Minimization and maximization of functions of one real variable; Minimization and maximization of functions of two real variables; Formulation of a linear optimization problem. Examples of linear

					optimization problems; Graphical method of solving linear optimization problems; Classical form of the linear optimization problem. Duality. Standard form of the linear optimization problem; Symplex method of solving linear optimization problems; SWOT analysis; Elements of game theory. Matrix games. Relationship between matrix games and linear optimization; Games of nature.
Computer Aided Engineering **(Master Degree)** Inżynieria wspomagana komputerowo dr hab. inż. Marcin Sosnowski, prof. UJD/ dr inż. Dorian Skrobek	3	45	lab.	Winter	The course aims at preparing the student for independent implementation of engineering projects using the SolidWorks 2018 software. The range of topics covers the preparation the technical documentation 2D and spatial models 3D. Completion of the course is the result of completing the tasks provided for in the schedule of classes and passing the colloquium with the use of CAD type software.
Mechatronics Mechatronika dr inż. Anna Kułakowska/ dr inż. Anna Żyłka	5	75	lecture+ex.+lab.	Winter	The practical application of mechatronic systems to build and optimize the operation of security systems.
Information society Społeczeństwo informacyjne **(Master Degree)** dr Rafał Głębocki	2	15	Lab	Winter	Presentation and discussion of the type of social media and discussion on the positive and negative impact on human life. To acquaint students with the legal basis for use from fixed-line and mobile telephony and the Internet. Comparison of the period before and after 2000.

Health and safety management systems Systemy zarządzania BHP dr inż. Joanna Jasińska	3	15	workshop	Winter	Students learn about the guidelines of the standards: PN-ISO 45001, PN-N 18001, PN-N 18002, PN-N-18011 and the principles of a systemic approach to management, including continuous improvement. Students will also learn the practical aspects of implementing an occupational health and safety management system in accordance with the PN-ISO 45001 standard.
Labor protection legal regulations Regulacje prawne ochrony pracy dr inż. Joanna Jasińska	1	10	lecture	Winter	Subject, functions, properties of labor law. Principles of labour law. Sources of labour law. Subjects of an employment relation. Establishing an employment relation. Termination and expiration of an employment relation. Obligations of an employer and an employee. The employee's responsibility for the breach of duties. Remuneration for work and other benefits. Working time, employee vacations. Labour protection - chapter X of the labour code. Supervision over labor law observance. Criminal and misdemeanor liability in the scope of labor protection.
Diploma seminar Seminarium dyplomowe dr hab. Alina Gil, prof UJD/ dr hab. Mikhail Selianinau, prof UJD	2	15	seminar	Winter	Classes prepare the student to submit the correct diploma thesis and to publicly present the subject of the diploma thesis with the use of multimedia equipment.

Medical engineering

Course title	ECTS	Hours	Form	Semester Winter	Course description
Self-presentation and public speaking Dr inż Karolina Grabowska	2	15	workshops	Winter	The aim of the course is to familiarise students with the methods and techniques of preparing and presenting a public speech, together with practical exercises. To discuss issues related to the image as an element of effective presentation, principles of self-presentation, presentation, speaking, and discussion in front of a wide audience.
Fundamentals of medical imaging Dr Kordian Chamerski	3	15+30	Lectures + laboratory	Winter	The aim of the course is to familiarise students with the principles of image formation in medical diagnosis and to understand the physical phenomena occurring during the formation of diagnostic images.
Medical instruments and apparatus Dr inż. Marcin Dyner	2	40	workshops	Winter	During the course, selected tools and medical equipment will be discussed along with a review and analysis of equipment available on the medical market. The construction and principles of operation of selected medical equipment and devices cooperating with them will also be discussed.
Engineering project	3	50	laboratory	Winter	Completion of a medical engineering project including preparation of technical documentation and justification of the chosen solution and the methods and tools used. Completion of the project includes the demonstration of advanced skills in the

dr hab. inż. Marcin Sosnowski, prof. UJD				use of specialized software to support the work of the engineer and the demonstration of the ability to obtain information from technical literature, standards, and technical standards.

Computer Science

Course title	ECTS	Hours	Form	Semester Winter	Course description
Fundamentals of Python programming Podstawy programowania w Pythonie Dr Lidia Stępień (wykład)	6	60	Lecture/Laboratory	Winter	The aim of the lecture is to familiarize students with the basics of programming using Python 3 as an example. The aim of the laboratory classes is to develop students' practical programming skills using the Python 3 language.
Computer graphics and multimedia Grafika Komputerowa I Multimedia Dr Artur Gola	7	60	Lecture/Laboratory	Winter	The aim of the lecture is to present the basic issues and problems of computer graphics along with the most important methods and algorithms used to solve them The aim of the laboratory is for students to acquire the ability to create realistic-looking models and the ability to create simple 3D animations.
Fundamentals of Java programming Podstawy programowania w Javie	5	60	Lecture/Lab	Winter	The aim of the lecture is to familiarise students with the basics, concepts, and methods of Java programming. The aim of the laboratory classes is to develop practical skills of students in programming with the Java language.

Dr Artur Gola					
Operating Systems Systemy operacyjne Mgr Jacek Małek	5	60	Lecture/Lab	Winter	The aim of the lecture is to familiarize students with the basic concepts of operating systems. The aim of the laboratory is to acquire practical skills related to the administration of the operating system (shell scripts) and to familiarize with the basics of programming processes and threads.
Basics of artificial intelligence Podstawy sztucznej Inteligencji Mgr Jolanta Podolszańska	6	60	Lecture/Laboratory	Winter	The aim of the lecture is to familiarize students with the basic methods of artificial intelligence and their practical applications. The aim of the laboratory is for students to acquire practical skills in using software using artificial intelligence algorithms.
Graph algorithms Algorytmy grafowe Dr hab. Bożena Woźna-Szcześniak	2	30	Lecture/Laboratory	Winter	The aim of the lecture is to familiarize students with basic graph algorithms. Their correctness and complexity will also be presented.

Multimedia Engineering

Course title	ECTS	Hours	Form	Semester Winter	Course description
Fundamentals of Python programming Podstawy programowania w Pythonie Dr Lidia Stępień	6	60	Lecture/Laboratory	Winter	The aim of the lecture is to familiarize students with the basics of programming using Python 3 as an example. The aim of the laboratory classes is to develop students' practical programming skills using the Python 3 language.
Sound and image perception Percepcja dźwięku i obrazu Dr hab. Anna Migalska-Zalas	4	45	Lecture/Laboratory	Winter	The aim of the course is to familiarise students with basic information and concepts concerning the perception of sound and image.
Computer graphics and multimedia Grafika Komputerowa I Multimedia Dr Artur Gola	7	60	Lecture/Laboratory	Winter	The aim of the lecture is to present the basic issues and problems of computer graphics along with the most important methods and algorithms used to solve them The aim of the laboratory is for students to acquire the ability to create realistic-looking models and the ability to create simple 3D animations.
Fundamental of signal processing Podstawy teorii przetwarzania sygnałów	5	45	Lecture/Laboratory	Winter	The aim of the course is to apply knowledge of the theory of audio signal processing during laboratory classes in the Python programming

Course title	ECTS	Hours	Form	Semester	Course description
Dr Rafał Miedziński					language and Anaconda software. In particular, the laboratory exercises will be based on the issues of frequency analysis (especially Fourier analysis).
Analysis of images and speech signals Analiza obrazów i sygnałów mowy Dr inż. Marcin Zastawnik	6	60	Lecture/Laboratory	Winter	Familiarizing students with the basic algorithms for processing digital images, from pre-processing algorithms to image analysis algorithms, as well as learning methods related to speech signal analysis.
Home audio-video installations Domowe instalacje audio-video Dr inż. Marcin Zastawnik	2	30	Laboratory	Winter	The classes are aimed at familiarizing participants with the technique used in home audio-video installations.

Innovative technologies and advanced materials

Course title	ECTS	Hours	Form	Semester Winter	Course description
Computer Science mgr Damian Ślimak	4	30	laboratory	Winter	The aim of the course is conducted to provide knowledge of the basics of computer science and to acquire basic programming skills in application to application software and database.
Information technology Dr Rafał Głębocki	1	15	laboratory	Winter	In the changing reality of the Network Society, Information Technology (IT) is of paramount significance. The IT course is a mixture of sociological and technological aspects of the

					contemporary digital world. From Marshall McLuhan (the world as a global village) to Ray Kurzweil (Artificial Intelligence). From the dawn of the Internet to Cloud Computing. The course aims to support students in mastering fundamental and practical IT notions that lead to success - both individually and in the professional environment.
Mechatronics Dr inż. Anna Żyłka	4	30 + 30	Practicals + laboratory	Winter	The course aims to acquaint students with basic information about electrical circuits and components of mechatronic systems. Students will be introduced to the construction and principle of operation of transformers and the role of sensors and controllers in systems.
Intellectual property protection dr inż. Karolina Grabowska	1	15	practicals	Winter	The main aim of the course is to know students the fundamentals of intellectual property protection based on international law. During the course, students analyze the procedures of patent obtaining in Polish and European patent offices.
Facultative subject III dr hab inż. Jarosław Krzywański, prof. UJD	2	30	workshops	Winter	The aim of the course is rising the students' engineering awareness and competencies and to follow the current technological achievements related to innovative technologies and materials in a selected field. The program contents are individually selected according to the students' choices in terms of the expected subject topic.
Computer Aided Design dr inż. Dorian Skrobek	3	40	laboratory	Winter	The aims course is to prepare students for the implementation of a design task using advanced tools to support the engineers' work. Students will learn the principles of engineering design in CAD software and they will make an individual project based on the instructions developed by the academic teacher.

Computer Aided Manufacturing Dr inż. Marcin Dyner	4	10+30	lectures + workshops	Winter	Practical classes of programming numerical controlled machines with the use of CNC simulators on the example of the Haas control system.
Engineering project I Dr hab. inż. Marcin Sosnowski, prof. UJD	3	45	laboratory	Winter	The course aims to prepare the student for the independent realization of engineering tasks using computer-aided design software and numerical simulations. The individually prepared project will be related to the subject of the new product design and optimization. The student's task will be preparing a complex report containing the stages of project accomplishment along with a detailed results analysis.
Prototyping using 3D printing technology dr inż. Tomasz Dembiczak	8	15+45	Lectures + workshops	Winter	The aim of the course is to acquire by the student the skills necessary to make prototypes using 3D printing technology.

Forensics and Security Systems

Course title	ECTS	Hours	Form	Semester Winter	Course description
Basics of Material Science Wybrane elementy materiałoznawstwa dr inż. Joanna Świątek-Prokop	4	30	lecture + lab.	Winter	Mechanical properties testing methods and non-destructive testing methods used in forensics
Physicochemical methods in forensics Metody fizykochemiczne w kryminalistyce prof. dr hab. Wojciech Marczak prof. dr hab. Pavlyuk Volodymyr dr Joanna Kończyk	6	45	lecture + lab.	Winter	Planning and conducting analyses of physicochemical forensic traces
The use of environmental sample analysis in forensic science Wykorzystanie analizy próbek środowiskowych w kryminalistyce dr Barbara Pawłowska	5	45	lab.+ workshops	Winter	Water quality control marking; Water analysis using the Spectroquant NOVA60 photometer. Quantitative determination of chlorides in Mohr water; Determination of soil level and quality parameters; Methods of collecting, storing and analyzing biological traces from environmental samples.
Molecular biology in forensics Biologia molekularna w kryminalistyce	3	30	lecture + lab.	Winter	Structure of DNA. Structure of a eukaryotic cell. Basic molecular processes in a eukaryotic cell. Selected aspects of human traits. Mitochondrial inheritance. Collection methods, workshop room. DNA

dr Marcin Sysa					and RNA techniques. Molecular methods of DNA analysis suitable in forensics. Molecular methods of DNA analysis suitable for forensics.
Selected elements of chemistry Wybrane elementy chemii prof. dr hab. Pavlyuk Volodymyr, dr Anna Nowik-Zając, dr inż. Kamila Lewicka	6	60	lecture + lab.+ exercises	Winter	The place of an element on the periodic table and its relationship with the structure of the atom. Structure of the molecule. Types of chemical bonds. Chemical reactions without changing the oxidation state and redox. Multicomponent systems - methods of expressing concentrations. Chemical equilibrium: reaction equilibrium constant and derivative quantities, acid-base reaction (pH), acid and base according to Lewis. Elements of thermochemistry - thermal effects of physical processes and chemical reactions.
Selected Aspects of Mechatronics Wybrane elementy mechatroniki dr inż Anna Kułakowska/ dr inż. Anna Żyłka	3	30	lecture + lab	Winter	The practical application of mechatronic systems to build and optimize the operation of security systems

Mathematics

Course title	ECTS	Hours	Form	Semester Winter	Course description
Numerical methods Metody numeryczne Prof. Povstenko Yuriy	2	30	Lecture/Lab	Winter	Getting students acquainted with the basic numerical methods and algorithms: interpolation and approximation of functions, numerical differentiation, numerical integration, numerical solving nonlinear equations and systems of linear equations.

Linear algebra 1 Algebra liniowa 1 Dr Renata Kawa	5	60	Lecture/ Exercise	Winter	The fields of real and complex numbers. Systems of linear equations. Matrices and determinants. General linear equations.
Introduction to logic and set theory Wstęp do logiki i teorii mnogości Dr Grzegorz Sitek	5	60	Lecture/ Exercise	Winter	Developing the ability to use propositional calculus and quantifiers in conducting reasoning; performing actions on sets and functions; interpreting problems from various fields of mathematics in the language of set theory; understanding issues related to the order in sets and the concept of the power of a set.
Introduction to data analysis Wprowadzenie do analizy danych Dr Jarosław Kowalski	8	60	Lecture/Lab	Winter	The aim of the course is to familiarize the student with basic descriptive statistics (mean, mode, median, quantiles) and their graphical representation. The student learns basic principles of presenting different types of data, techniques of visualization multidimensional data, clustering algorithms (hierarchical and k-means), analysis variance analysis and classification trees.
Abstract algebra Algebra abstrakcyjna Dr Renata Kawa	7	60	Lecture/Exercise	Winter	Introduce the basic concepts and theorems of abstract algebra.
Computer typesetting in Latex Komputerowy skład w Latex-u Dr Renata Kawa	2	15	Lab	Winter	The aim of the laboratory is to familiarize students with the practical principles of computer typesetting in the LaTex system.

Spreadsheets Arkusze kalkulacyjne Mgr Damian Ślimak	2	30	Lab	Winter	The aim of the laboratory is to familiarize students with the EXCEL spreadsheet and to acquire the ability to prepare calculation sheets using built-in functions.