THE SHORT COURSE CATALOGUE FOR ERASMUS STUDENTS

Course title and English translation	**Biochemia Farmaceutyczna** **Pharmaceutical Biochemistry**
The form of the course (hrs.)	Lectures (45) Practical classes (60)
Form of assessment	Examination
Semester	Winter
ECTS credits	7
Brief course content description	In the first sections, the course provides a high-level overview on the structure, chemistry and function of biological macromolecules including proteins, nucleic acids, carbohydrates, lipids, hormones and vitamins. Next sections explore molecular background of basic metabolic processes occurring in living organisms. Topics include: enzymology, biosynthetic and catabolic pathways of relevant molecules, cellular energetics, membrane transport mechanisms, cellular signalling and xenobiotics/drugs transformation pathways. Macromolecular targets of drug action are emphasized during the course. The lectures are accompanied by thematically bound practical exercises.
Language information	- Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of individual work
Learning resources in English	- "Biochemistry" Eds.: David Hames & Nigel Hooper, Third Edition, Tylor & Francis Group 2005 - "Biochemistry" Eds.: Jeremy M Berg, John L Tymoczko, Lubert Stryer, Fifth Edition, W. H. Freeman & Company 2002; - Teaching materials in English provided by tutor
Contact person for Erasmus students	Dr Jakub Gburek, Dept. of Pharmaceutical Biochemistry; jakub.gburek@umed.wroc.pl; Tel. +48 71 784 05 31
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Biofarmacja** **Biopharmacy**
The form of the course (hrs.)	Lectures (25) Practical classes (20) Office hours (15)
Form of assessment	Examination
Semester	Summer
ECTS credits	5
Brief course content description	Methods for evaluation of pharmaceutical and biological availability, bioequivalence, and *in vitro* – *in vivo* correlations. Methods for mathematical description of the drug liberation process. Methods for mathematical description of basal physicochemical processes responsible for the liberation of active substance from drug form – dissolution and diffusion. Methods for evaluation and comparison of different release kinetic models. Drug administration routes. Permeation of active substances through biological barriers. Biopharmaceutical aspects of drug administration via different routes: oral, rectal, topical, nasal, ophthalmic etc. Theoretical aspects of preparation of prolonged and modified release drug forms.
Language information	- Polish - Language support for English-speaking students
Learning resources in English	- European Pharmacopoeia 8th Ed. - Martin's Physical Pharmacy and Pharmaceutical Sciences. P.J. Sinko, ed., Lippincott Williams & Wilkins - FastTrack: Physical Pharmacy. D. Attwood, A.T. Florence; Pharmaceutical Press - teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr Dominik Marciniak, Drug Form Technology Dept., dominik.marciniak@umed.wroc.pl, tel. +48 71 7840322
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Biotechnologia Farmaceutyczna** **Pharmaceutical Biotechnology**
The form of the course (hrs.)	Lectures (15) Practical classes (15) Individual work (80) Office hours (2) this department conducts 5 h. lectures and 15 h. lab classes
Form of assessment	Practical course completion and written essay on chosen topic (credit without mark)
Semester	Spring
ECTS credits	2
Brief course content description	Basic concepts of biotechnology in pharmaceutical applications. Cells, organs and living organisms as biofactories for production of pharmaceuticals. Recombinant biopharmaceuticals. Industrial bioprocesses in production of drugs and biopharmaceutical. Introduction to cell and tissue cultures – lab. Molecular methods in pharmaceutical biotechnology - lab
Language information	- Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of individual work
Learning resources in English	- Pharmaceutical Biotechnology: Fundamentals and Applications. by Daan J. A. Crommelin (Editor), Robert D. Sindelar (Editor), Bernd Meibohm (Editor) - any reliable online resources are also suitable
Contact person for Erasmus students	Prof. Dr. Adam Matkowski, Dept. Pharmaceutical Biology (Division of Pharmaceutical Biotechnology), or Dr. Monika Bielecka, Div. Pharmaceutical Biotechnology bbsekret@umed.wroc.pl tel. +48 71 784 0497
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation)	**Botanika** **Pharmaceutical Botany** (study of medicinal plants – nomenclature, taxonomy, biology, chemical characteristics, use in pharmacy, ethnopharmacology)
The form of the course (hrs.)	Lectures (30) Practical classes (60) Individual work (180) Office hours (15)
Form of assessment	Practical and written examination
Semester	Spring
ECTS credits	8
Brief course content description	Botany/Plant Biology as a scientific discipline. Basic terms and botanical nomenclature. Systems of classification of plant kingdom. Medicinal plants as source of drugs and bioactive substances. Systematic review of medicinally relevant taxons with emphasis on biological and phytochemical properties. Microscopic observation and analysis of characteristic plant tissues and cellular structures. Identification of medicinal plants based on the morphology.
Language information	- Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of individual work
Learning resources in English	- *Pharmacognosy, phytochemistry, medicinal plants*, Bruneton J. 2nd edition, Lavoisier, Paris / London 1999, 2001 - *Medicinal natural products a biosynthetic approach*, Dewick P.M. 2nd edition, John Wiley & Sons, London 2001 - *Chemistry of natural products*, Bhat S.V., Nagasampagi B.A., Sivakumar M. Narosa, New Delhi / Springer Verl., Berlin-Heidelberg 2002 - any reliable online resources are also suitable
Contact person for Erasmus students	Prof. Dr. Adam Matkowski, Dept. Pharmaceutical Biology, bbsekret@umed.wroc.pl tel. +48 71 784 0497
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Bromatologia** **Food Science and Nutrition**
The form of the course (hrs.)	Lectures (30) Practical classes (45) Individual work (86) Other (7)
Form of assessment	Examination (unseen)
Semester	Winter
ECTS credits	5
Brief course content description	The course "Food science and nutrition" is designed to provide an in-depth insight into fundamentals of human nutrition, food sciences and the implications of nutrition on health. Course will cover following topics: 1. Principles of human nutrition and nutrient requirements as well as their applications in the assessment of risk of diseases, such as obesity, cardiovascular disease etc. 2. Potential drug-nutrients and drug-dietary supplements interactions and their influence on the drug effectiveness and nutritional status. 3. Methods of assessment of nutritional behaviors and nutritional status. 4. Food analysis – macro- and micronutrient determination and the quality evaluation of food.
Language information	- Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of essays, collaborative/group projects.
Learning resources in English	- C.D. Berdanier , J. Dwyer, E.B. Feldman "Handbook of nutrition and food", CRC Press, 2nd edition, 2007 - M.J. Gibney, B.M. Margetts "Public Health Nutrition" Wiley-Blackwell, 2004 - S.D. Damodaran, K.L. Parkin, O.R. Fennema "Fennema'a Food Chemistry" 4th edition, CRC Press, 2007 - K.A. Meckling "Nutrient -Drug Interactions" CRC Press, 2006 - teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr Magdalena Grajzer, Dep. of Food Science and Nutrition, magdalena.grajzer@umed.wroc.pl , tel. +48 71 784 02 08
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Chemia organiczna** **Organic Chemistry**
The form of the course (hrs.)	Lectures (60) Practical classes (150) Seminars (20) Individual work (20)
Form of assessment	Written examination
Semester	Winter/summer
ECTS credits	16 (lectures; practicals) + 1 (seminars) = 17
Brief course content description	Lecture program (winter semester) 1. Alkanes, alkenes, alkynes, alicyclic hydrocarbons. The concept of unsaturation. 2. Polymerisation – polymers, copolymers. 3. Preparation of hydrocarbons, properties, occurrence in nature. 4. Types of chemical bonds in organic compounds. 5. Isomerism of organic compounds. 6. Nomenclature in organic chemistry 7. Reaction mechanisms. 8. Aromatic hydrocarbons. Properties, reactivity, syntheses. Lecture program (summer semester) 1. Oxygen – containing organic compounds. 2. Sulphur compounds – preparation, properties. 3. Nitrogen compounds: a) amines, amides, urea, imides, nitriles, isonitriles, cyanides and related compounds. b) amino acids, peptides, proteins 4. Organometallic compounds. 5. Heterocyclic systems containing atoms of nitrogen, oxygen or sulphur: a) mononuclear. b) polynuclear c) significance of adenine, guanine, cytosine, thymine in creating the genetic code. 6. Carbohydrates – monosaccharides, polysaccharides, glucosides. 7. Natural compounds occurring in animals and plants – hormones, terpenes, vitamins, flavones, prostaglandins. 8. Azo dyes. Laboratory classes program (winter semester) 1. Health and safety rules. 2. Purification methods: a) crystallisation using inflammable and non- inflammable solvents. b) simple distillation, fractional distillation, steam distillation, distillation under diminished pressure. c) extraction 3. Performing four preliminary exercises and one simple preparation. 4. Criterion of purity of substances 5. Knowledge of organic syntheses methods and mechanisms reactions of: nitration, sulfonation, Friedel – Crafts alkylation, esterification, hydrolysis, ethers analysis, coupling, reactions of diazonium salt, reduction, oxidation, elimination reactions, condensation, methods of synthesis of heterocyclic compounds. Students of Pharmaceutical faculty must be familiar with full details of the experiment as well as the underlying theory. Laboratory classes program (summer semester) 1. Performing three simple preparations, including one complex synthesis. 2. Organic analysis: a) determination of: the solubility groups, functional groups, b) characteristic class reactions, c) selected and preparation suitable derivatives. 3. Identification of two unknown organic compounds and interpretation of spectra for the second of compound.
Language information	- Lectures language: Polish, Seminars language: English - English teaching support and examination (Erasmus students)
Learning resources in English	- "*Texbook of Practical Organic Chemistry. Including Qualitative Organic Analysis"* A. I. Vogel, 6th Edition, Longman, London, 2000 - "*Organic Chemistry"* John McMurry 8th Edition, Brooks Cole, 2011 - "*Organic Chemistry"*A. S. Wingrove; R. L. Caret, Harper & Row, Publishers, NY, 1981 - "*Organic Chemistry"* R. T. Morrison; R. N. Boyd 3th edition, Allyn & Bacon, Inc,Boston, 1973
Contact person for Erasmus students	Dr Karina Kowalczewska Organic Chemistry Dept., karina.kowalczewska@umed.wroc.pl,
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Ćwiczenia specjalistyczne z metodologią badań naukowych**	
	Specialised Exercises with Scientific Research Methodology (Thesis research)	
The form of the course (hrs.)	Specialised practical classes (375) Individual work (225)	
Form of assessment	Supervisors' assessment	
Semester	Summer	
ECTS credits	20	
Brief course content description	laboratory safety, literature research methodology, scientific databases, literature research, lab book – recording of research, preparation of theoretical part of work based on literature, analysis of scientific topic and development of research directions, obtaining of research material, experiments, learning of new techniques, verification of the results, analysis, data elaboration, comparison of the results with literature data, forming conclusions of the research, preparation of the thesis, corrections according to the revisions.	
Language information	Supervision in English, other languages may be available depending on the supervisor	
Learning resources in English	*Individually proposed by the supervisor*	
Available research areas and contact persons*	**Department**	**Contact person**
	Biology and Botany, Pharmaceutical biotechnology	Prof. dr hab Adam Matkowski bbsekret@umed.wroc.pl
	Physicochemical aspects of pharmaceutical sciences: drug development, preformulation studies	dr hab. Witold Musiał witold.musial@umed.wroc.pl
	Pharmacognosy, natural medicines, phytochemistry,	dr Piotr M. Kuś erasmus.umw@gmail.com
	Bromatology, Food Science and Nutrition	dr Magdalena Grajzer magdalena.grajzer@umed.wroc.pl
	Biochemistry	dr hab. Jakub Gburek jakub.gburek@umed.wroc.pl
	Other topics may be available after individual arrangement with appropriate other supervisor	
General contact person for Erasmus students	Dr Piotr M. Kuś, Pharmacognosy Dept., erasmus.umw@gmail.com, tel. +48 71 784 02 11	
* - individual arrangement needed, the availability of the mentors depends on specific period, number of students etc.		

Course title and English translation	**Farmakognozja** **Pharmacognosy** (study of medicinal drugs derived from plants or other natural sources)
The form of the course (hrs.)	Lectures (60) Practical classes (90) Individual work (180) Office hours (15)
Form of assessment	Practical and written examination
Semester	Winter
ECTS credits	12
Brief course content description	Groups of bioactive natural compounds and their natural sources including: carbohydrates, simple phenolics & their esters, phenolic glycosides, phenolic acids and their derivatives, glucosinolates & allyl sulphides, cyanogenic glycosides, flavonoids, coumarins & furanochromones, anthocyanins, tannins, anthranoids, essential oils, iridoids, plant bitters, saponins, diterpenes & triterpenes, phytosterols, cardiac glycosides, alkaloids. Latin nomenclature of natural plant substances included / not included in pharmacopoeia, botanical/zoological origin, occurrence, definitions, structures and names of active compounds, way of standardization, main directions and mechanisms of pharmacological activity of substances and natural compounds, toxicity, adverse effects, contraindications. Pharmacognostic Methods for Analysis of Herbal Drugs, identification of plant substances and assessment of their quality, basics of phytochemical analysis, selected practical aspects related to recommendation and application of natural drugs.
Language information	- Course language: Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of individual work
Learning resources in English	- *Pharmacognosy, phytochemistry, medicinal plants*, Bruneton J. 2nd edition, Lavoisier, Paris / London 1999, 2001 - *Medicinal natural products a biosynthetic approach*, Dewick P.M. 2nd edition, John Wiley & Sons, London 2001 - *Chemistry of natural products,* Bhat S.V., Nagasampagi B.A., Sivakumar M. Narosa, New Delhi / Springer Verl., Berlin-Heidelberg 2002 - *Trease and Evans Pharmacognosy,* Evans W.C. 15th edition, Saunders, London 2002
Contact person for Erasmus students	Dr Maciej Włodarczyk, Pharmacognosy Dept., maciej.wlodarczyk@umed.wroc.pl, tel. +48 71 784 02 23
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Farmakologia kliniczna** **Clinical Pharmacology**
The form of the course (hrs.)	Lectures (15) Practical classes (15) Individual work (30) Office hours (5)
Form of assessment	Written examination
Semester	Summer
ECTS credits	2
Brief course content description	1. Adverse drug effects, with particular emphasis on adverse consequences of drug interactions important in medical practice. Reporting of drug-induced complications. 2. Individualization of pharmacotherapy in children and the elderly. 3. Optimization of pharmacotherapy based on genetic testing. 4. Optimization of pharmacotherapy during pregnancy. 5. Pathopharmacokinetics. Drug dosage adjustment in kidney failure. 6. The influence of environmental factors and circadian rhythm to the drugs. 7. Effective and safe pharmacotherapy of pain. 8. Rational antibiotic therapy. 9. Therapeutic drug monitoring. Individualization of drug therapy. 10. Pharmacoeconomics. The aspects of treatment. 11. The interpretation of the characteristics of pharmaceutical medicines and critical evaluation of promotional materials for the drug. 12. Conducting clinical trials in accordance with the principles of GCP. Ethical aspects of clinical trials of new drugs and placebo. Interpretation of clinical protocols I, II, III, IV trials. Planning a clinical trial. 13. EBM in pharmacotherapy. 14. Compliance with treatment recommendations.
Language information	- Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of individual work
Learning resources in English	- Katzung B.G., Trevor A.J.: Basic & clinical pharmacology. McGraw Hill Education LANGE, 2014. - Müller M.: Clinical Pharmacology: Current Topics and Case Studies. Springer International Publishing, 2016. - Altman R.B., Flockhart D., Goldstein D.B.: Principles of pharmacogenetics and pharmacogenomics. Cambridge University Press, 2012. - Bennett P.N., Brown M.J., Sharma P.: Clinical pharmacology. Churchill Livingstone Elsevier, 2012. - Friedman L.M., Furberg C.D., DeMets D.L.: Fundamentals of Clinical Trials. Springer, 2010.
Contact person for Erasmus students	Dr Przemysław Niewiński, Clinical Pharmacology Dept., p.niewinski@gmail.com, tel. +48 71 784 06 01
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Fizykochemiczne podstawy medycyny laboratoryjnej** **Physicochemical Principles for Laboratory Medicine**
The form of the course (hrs.)	Lectures (15) Practical classes (30) Individual work (105) Office hours (10)
Form of assessment	Examination
Semester	Winter
ECTS credits	4
Brief course content description	1. States of matter and elements of thermodynamics 2. Physicochemical properties of biological systems 3. Solubility and solutions of nonelectrolytes and electrolytes, ionic equilibria, buffers, isotonic solutions 4. Galvanic cells, red-ox reactions, electromotive force 5. Kinetics in chemistry and pharmacy 6. Diffusion and interfacial phenomena, colloids and rheology 7. Physical chemistry and diagnostic tests 8.Elementary physical chemistry of macromolecules
Language information	- Polish - Language support for English-speaking students
Learning resources in English	- Martin A., Bustamante P., Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences, Waverly International, Baltimore, 1993, and newer editions - Cooper A., Biophysical Chemistry, Royal Society of Chemistry, London, 2011 - Allen J.P., Biophysical Chemistry, John Wiley & Sons, Chichester, 2009 - teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr hab. Witold Musiał, Department of Physical Chemistry, witold.musial@umed.wroc.pl, tel. +48 71 7840231 (foreign languages available: English, German, Spanish, basic communication: Slovene, Czech; scientific materials available in English, with assistance in the above languages)
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Fizykochemiczne podstawy nauk farmaceutycznych** **Physicochemical Principles of Pharmaceutical Sciences**
The form of the course (hrs.)	Lectures (30) Practical classes (75) Individual work (50) Office hours (5)
Form of assessment	Examination
Semester	Winter
ECTS credits	8
Brief course content description	1. States of matter in pharmaceutical systems 2. Elements of thermodynamics 3. Physicochemical properties of biologically active substances 4. Solubility and solutions of nonelectrolytes and electrolytes, ionic equilibria 5. Buffered and isotonic solutions 6. Galvanic cells, red-ox reactions, electromotive force 7. Kinetics in chemistry and pharmacy 8. Diffusion and interfacial phenomena 9. Colloids and rheology 10.Physical chemistry and drug product design 11.Elementary physical chemistry of macromolecules
Language information	- Polish - Language support for English-speaking students
Learning resources in English	- Martin A., Bustamante P., Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences, Waverly International, Baltimore, 1993, and newer editions - Attwood D., Florence A.T., FASTtrack Physical Pharmacy, Pharmaceutical Press, London, 2012 - Smith B.T., Remington Education: Physical Pharmacy, Pharmaceutical Press, London, 2015 - teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr hab. Witold Musiał, Department of Physical Chemistry, witold.musial@umed.wroc.pl, tel. +48 71 7840231 (foreign languages available: English, German, Spanish, basic communication: Slovene, Czech; scientific materials available in English, with assistance in the above languages)
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Higiena z epidemiologią** **Hygiene with Epidemiology**
The form of the course (hrs.)	Lectures (10) Seminars (20)
Form of assessment	Presentation and test (credit without mark)
Semester	Winter
ECTS credits	2
Brief course content description	Hygiene and epidemiology as a sciences. The Mandala of Health: A Conceptual Model and Teaching Tool. Health Promotion**.** Introduction to public health. Occupational safety and health. Hand washing techniques. Physical, chemical and biological factors. Measuring of disturbance factors in working environment. The effect of environmental quality, life style and socio-economic factors on human health. Chemical and biological pollution of water, soil and air. Drinking water standards. Principle and practise of health promotion. Health promotion programs. Social determinants of health. Basics of health management. The principles of hygiene in hospital environment. Methods of cleaning, disinfection and sterilization. Epidemic and endemic diseases. Disposal of waste. Measures to be taken following occupational exposure to potentially infectious biological material. Occupational diseases. Epidemiological research methods. Statistical method. Medical and epidemiological databases. Observations and experiments in epidemiology.
Language information	- Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of seminars
Learning resources in English	- Yoav Ben-Shlomo, Sara Brookes, Matthew Hickman "Epidemiology, Evidence based Medicine and Public Health, 6th Edition" WILEY, edition: 6, pub. year: 2013 - Richard A Sprenger, Hygiene for Management, 2015, 18th Edition - teaching materials in English, provided by tutor
Contact person for Erasmus students	Professor Halina Milnerowicz (English) e-mial: halina.milnerowicz@umed.wroc.pl Dr Anna Bizoń (German), e-mail: anna.bizon@umed.wroc.pl; Dr Marta Kepinska (English), e-mail: marta.kepinska@umed.wroc.pl Dr Mariola Śliwińska-Mossoń (Russian), e-mail: mariola.sliwinska-mosson@umed.wroc.pl Department of Biomedical and Environmental Analyses, Wroclaw Medical University, Borowska 211, 50-556 Wroclaw, Poland, tel. +48 71 7840175, fax. +48 71 7840172,
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Klasyczne metody analizy ilościowej** **Classical Methods of Quantitative Analysis**
The form of the course (hrs.)	Lectures (15) Practical classes (35)
Form of assessment	Examination
Semester	Summer
ECTS credits	2
Brief course content description	Description of the basic phenomena in aqueous solutions; fundamentals of volumetric analysis: titration curve, equivalence- and endpoint; different type of indicators; procedures of: acid-base, redox, complexometric and precipitation titration; gravimetric analysis; typical calculations used in quantitative analysis; validation of analytical method.
Language information	- Polish - Language support for English-speaking students and examination in English Erasmus students can complete the lecture program in the form of individual consultations
Learning resources in English	- D.A Skoog, D.M. West, F.J. Holler, S.R. Crouch: "Fundamentals of Analytical - Chemistry", Brooks Cole, 8nd edition, 2004 - D.C. Harris: "Quantitative chemical analysis" New York, NY : W.H. Freeman and - Co., 7nd edition 2007 - teaching materials in English, provided by tutor
Contact person for Erasmus students	Mgr Ewa Brylska, Analytical Chemistry Dept., ewa.brylska@umed.wroc.pl, tel. +48 71 784 06 42
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Mikrobiologia farmaceutyczna** **Pharmaceutical Microbiology**
The form of the course (hrs.)	Practical classes (60) Seminars (4)
Form of assessment	Examination
Semester	Summer
ECTS credits	3
Brief course content description	1. Bacterial and fungal morphology. Microorganisms' culturing and staining techniques. 2. Serological reactions and viral infections diagnostics 3. Importance of microbiome of human. Sterilization and disinfection. Antiseptics' effectiveness. 4. Antibiotics, mechanisms of bacterial resistance to antibiotics and chemotherapeutics 5. Gram-positive bacteria 6. Gram-negative bacteria 7. Atypical bacteria 8. Yeasts and moulds
Language information	- Polish - Language support for English-speaking students
Learning resources in English	- Teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr Adam Junka, adam.junka@umed.wroc.pl, Pharmaceutical Microbiology and Parasitology Dept. tel. +48 889 229 341
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Nowe tendencje w syntezie, technologii i biotechnologii środków leczniczych** **New Trends in Synthesis, Technology and Biotechnology of Pharmaceuticals**
The form of the course (hrs.)	Seminars (20)
Form of assessment	Presentation (credit without mark)
Semester	Winter/summer
ECTS credits	1
Brief course content description	**A. New trends in search of biologically active substances: stereochemistry, nanotechnology and biotechnology.** 1 Chiral drugs -stereochemical aspects of the drugs: pharmacodynamic and pharmacokinetic differences between drug enantiomers separation of optically active compound, asymmetric synthesis. 2.Nanotechnology, biomaterials, polymer materials - used in medicine and pharmacy. 3. Biotechnology Drugs- monoclonal antibodies, vaccines, drugs prepared by the methods of genetic engineering. **B. Methods for the design and synthesis of compounds of expected pharmacological Activity.** 1. Modern drug design, the relationship between structure and action, drug Targets. 2. "green chemistry". 3. Synthesis of the solid supports, combinatorial synthesis. 4. Synthesis of compounds using microwave irradiation.
Language information	- Polish - Language support for English-speaking students
Learning resources in English	- Chiral Drugs: Chemistry and Biological Action; Guo-Qiang Lin, Qi-Dong You, Jie-Fei Chenge - Drug Design. Structure- and Ligand-Based Approaches; Kenneth M. Merz, Dagmar Ringe, Charles H. Reynolds - Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications; Oliver Kayser, Heribert Warzecha - Medical Nanotechnology and Nanomedicine; Harry F. Tibbals - teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr Lilianna Becan, Drug Technology Dept., lilianna.becan@umed.wroc.pl, tel. +48 71 7840242
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Ocena kinetyki uwalniania substancji leczniczych** **Evaluation of Release Kinetics of Drugs from Pharmaceutical Systems**
The form of the course (hrs.)	Practical classes (75) Individual work (30) Office hours (10)
Form of assessment	Examination
Semester	Summer
ECTS credits	8
Brief course content description	1. Application of chemical kinetics to release studies 2. Development of analytical method of selected active pharmaceutical ingredient (API) 3. Evaluation of release rates of API from selected pharmaceutical system 4. Statistical interpretation of data 5. Preparation of a conference poster or communication
Language information	- Polish - Language support for English-speaking students
Learning resources in English	- Martin A., Bustamante P., Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences, Waverly International, Baltimore, 1993, and newer editions - Cooper A., Biophysical Chemistry, Royal Society of Chemistry, London, 2011
Contact person for Erasmus students	Dr hab. Witold Musiał, Department of Physical Chemistry, witold.musial@umed.wroc.pl, tel. +48 71 7840231 (foreign languages available: English, German, Spanish, basic communication: Slovene, Czech; scientific materials available in English, with assistance in the above languages) Laboratory practical courses are available
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Oznaczanie ilościowe wybranych leków z wykorzystaniem różnych technik miareczkowania** **Quantification of Selected Drugs Based on Variety of Titration Techniques**
The form of the course (hrs.)	Practical classes (35) Seminars (5)
Form of assessment	Practical examination
Semester	Winter
ECTS credits	2
Brief course content description	Titration is a common laboratory method of quantitative pharmaceutical analysis. In order to present those techniques we organize a 40 hours course. Students will analyze sample contains selected drugs using quantitative analysis based on pharmacopoeial protocols. Training will base on titration techniques like: acid-base, complexometric, redox, precipitation, and "nonaqueous methods" (titration of organic bases with perchloric acid in anhydrous acetic acid or organic acids with sodium methoxide in dimethylformamide). Application of such methods require from student manual precision.
Language information	- Language support for English-speaking students and examination in English
Learning resources in English	- **European Pharmacopoeia (7th Edition)** - teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr Łukasz Szyrwiel, Dept. of Chemistry of Drugs, lukszyr@wp.pl, tel. +48 717840399 Mgr Łukasz Szczukowski, Dept. Of Chemistry of Drugs, lukasz.szczukowski@umed.wroc.pl, Tel. +48 717840399
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Toksykologia** **Toxicology**
The form of the course (hrs.)	Office hours/lectures (24) Practical classes (60) Seminars (4)
Form of assessment	Examination
Semester	Winter
ECTS credits	7
Brief course content description	**Program of lecture** General toxicological definitions: NOAEL, LD, NDS, DSB, etc. The influence of physical-chemical and biological factors on compounds toxicity. Absorption of xenobiotics, distribution, excretion, biotransformation. Mechanism of toxic action. The treatment of acute poisoning (antidota – name and the mechanism of action). Mutagenesis, cancerogenesis, teratogenesis. Interactions. Toxicity of drugs: barbituranes, benzodiazepines, phenothiazines, opiates, antidepressive drugs, inhibitors MAO, salicylates, *p*-aminophenol derivatives. Toxicomanias. **Program of laboratory exercises** The identification and detection of barbituranes by thin layer chromatography (TLC). The identification and detection of alkaloids by TLC. The identification and detection of phenothiazine by TLC. The quantitative determination of delta-aminolevulinic acid in urine as the indicator of lead exposure. The determination of delta-aminolevulic acid dehydratase (delta-ALAD) in blood as the indicator of lead exposure. The determination of cholinesterase (ChE) activity in serum as the indicator of phosphoroorganic compounds exposure. The quantitative determination of *p*-aminophenol as the indicator of aniline and nitrobenzene exposure. The quantitative determination of free sulphonamides (sulfa drugs) in urine. The qualitative estimation of benzodiazepines in ultraviolet spectrum. The qualitative estimation of antidepressive drugs in ultraviolet spectrum. The detection of meprobamat in urine by colorimetric method. The quantitative determination of salicylates in urine. **Program of seminars** The toxicity of metals. The toxicity of solvents.
Language information	Polish/Italian/English Consultation/examination/exercises in English
Learning resources in English	Curtis D. Klassen, John B. Wathins, Essential of Toxicology 2010; K.S. Borowiak, A. Mokrzyńska Handbook of Toxicology
Contact person for Erasmus students	Dr Ewa Sawicka, Toxicology Dept., e-mail: ewa.sawicka@umed.wroc.pl tel. 71 784 04 55
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Toksykologia dla diagnostów** Toxicology for Diagnostics
The form of the course (hrs.)	Lectures (30) Practical classes (45)
Form of assessment	Examination
Semester	Winter
ECTS credits	6
Brief course content description	Basic concepts of toxicology - toxin (poison), toxicity, toxicity levels, types of poisonings. The fate of xenobiotics in the body. The mechanisms of toxicity. Metabolic and morphological induced by poisons. Procedures to be followed in poisoning. Methods for toxicological analysis in intoxication of drugs, alcohols, organic solvents, pesticides and heavy metals. Methods for determination of xenobiotics and their metabolites in the biological material. Methods for evaluation of acute toxicity, subacute, chronic, actions carcinogenic, mutagenic and teratogenic. Skills and competencies: using their knowledge of toxicology of general and specific in the assessment of exposure to toxic substances; evaluate the effects of toxic substances and the possibility of the diagnosis of poisoning; selection of material for toxicological studies; perform toxicological analyzes; interpretation of the results of toxicological studies.
Language information	- Polish - Language support for English-speaking students and examination in English - Erasmus students can complete the lecture program in the form of seminars
Learning resources in English	- E. Stanley: "Toxicological Chemistry and Biochemistry" PWN Press, 2011 - teaching materials in English, provided by tutor
Contact person for Erasmus students	Professor Halina Milnerowicz (English), e-mail: halina.milnerowicz@umed.wroc.pl Dr Anna Bizoń (German), e-mail: anna.bizon@umed.wroc.pl Dr Marta Kepinska (English), e-mail: marta.kepinska@umed.wroc.pl Dr Mariola Śliwińska-Mossoń (Russian), e-mail: mariola.sliwinska-mosson@umed.wroc.pl Department of Biomedical and Environmental Analyses, Wroclaw University of Medicine, Borowska 211, 50-556 Wroclaw, Poland, tel. +48 71 7840171, fax. +48 71 7840172
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Zdrowie w dialogu międzykulturowym** **Health in Intercultural Dialogue Perspective**
The form of the course (hrs.)	Practical classes (10) Seminars (10) Individual work (10)
Form of assessment	Essay (credit without mark)
Semester	Winter or Summer
ECTS credits	1
Brief course content description	The course has two sections. 1. **Health, disease and prevention in selected religious traditions**. Seminars will address the issues of an approach to health and diseases and their prevention in various religious traditions. This knowledge can be necessary for the pharmacist, whose professional work in the future may face the challenge of multicultural modern world. 2. **Unconventional medicine**. The purpose of this section is to present social and cultural differences associated with alternative medicine practitioners.
Language information	- English
Learning resources in English	- Teaching materials in English, provided by tutor
Contact person for Erasmus students	Dr Mateusz Dąsal, Humanities Department., mateusz.dasal@umed.wroc.pl, tel. +48 602265064
For more details please contact us or refer to our syllabus (in Polish) : http://www.farmacja.umed.wroc.pl/content/farmacja	

Course title and English translation	**Praktyki laboratoryjne** **Laboratory Training**	
The form, program and period	According to the individual arrangement	
Form of assessment	Supervisors' assessment	
Language information	Supervision in English	
Available departments*	**Department**	**Contact person**
	Biology and Botany Dept., Pharmaceutical Biotechnology Dept.	Prof. dr hab Adam Matkowski bbsekret@umed.wroc.pl
	Physical Chemistry Dept.	dr hab. Witold Musiał witold.musial@umed.wroc.pl
	Pharmacognosy Dept.	dr Piotr M. Kuś erasmus.umw@gmail.com
	Bromatology and Dietetics Dept.	dr Magdalena Grajzer magdalena.grajzer@umed.wroc.pl
	Biochemistry Dept.	dr hab. Jakub Gburek jakub.gburek@umed.wroc.pl
General contact person for Erasmus students	Dr Piotr M. Kuś, Pharmacognosy Dept., erasmus.umw@gmail.com, tel. +48 71 784 02 11	
* - individual arrangement needed, the availability of the mentors depends on specific period, number of students ecc.		