



ECTS catalogue for courses offered in English at Faculty of Fundamentals of Technology

in academic year 2021/2022*

Course code	Course name	Semester	Number of hours	Teacher	ECTS
P01	Applications of MATHCAD to some technical issues of mechanics and physics	I	30	prof. Mikhaylo Pashechko	6
P09	Basics of WEB Technologies	II	15	dr Robert Lis	4
P18	Calculus	I,II	30	mgr inż. Magdalena Jastrzębska	6
P19	Complex analysis	I,II	30	mgr inż. Anna Futa	6
P03	Econometrics	II	15	dr Anna Makarewicz	4
P04	Electronics	I, II	30	dr inż. Michał Charlak	4
P05	Graph theory	I	30	dr Izolda Gorgol	6
P15	Introduction to Data Analysis	I	30	dr Dariusz Majerek	6
P14	Introduction to functional analysis	I,II	15	dr Renata Buczko	4
P07	Linear algebra	I, II	30	dr Ewa Łazuka	6
P08	Mathematical foundations of life insurance	II	30	dr Paweł Właż	6
P10	Random processes	I,II	30	dr hab. Yaroslav Chabanyuk, prof. uczelni	6

P11	Selected problems in applied computer science	I	15	mgr inż. Magdalena Paśnikowska- Łukaszuk	4
P16	Selected problems in engineering (lecture + laboratory)	II	30	dr hab. Inż. Dorota Wójcicka-Migasiuk, prof. uczelni mgr inż. Magdalena Paśnikowska- Łukaszuk	6
P17	Selected problems in engineering (lecture)	II	15	dr hab. Inż. Dorota Wójcicka-Migasiuk, prof. uczelni	4
P12	Selected problems in technology	II	15	mgr inż. Magdalena Paśnikowska- Łukaszuk	4
P13	Selected topics of financial mathematics	I,II	30	dr Janusz Szuster	6

* All courses, contents of them and teachers are subject to change.

There is no possibility to apply for the whole academic year 2021/22, only applications for one semester can be approved.

There won't be possibility for extending mobility from winter to summer semester.

A course will be opened if at least 10 students apply. In case of fewer students interested in a course an individual work may be proposed.

A student can prepare his/her Learning Agreement with at most 33 ECTS.



FACULTY OF FUNDAMENTALS OF TECHNOLOGY - LUBLIN UNIVERSITY OF TECHNOLOGY PL LUBLIN03

Applications of MATHCAD to some technical issues of mechanics and physics – P01

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture+ laboratory
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter	CLASS LEVEL: bachelor/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: calculus, basic physics
CONTENTS: matrix calculations, plotting, solving system of equations, differential and integral calculus, limits, technical mechanics and physics, kinematics, dynamics
EFFECTS OF EDUCATION PROCESS: student will be able to apply MATHCAD to solve some technical problems from mechanics or physics
LITERATURE (OPTIONAL):
TEACHING METHODS: lecture+ laboratory
ASSESSMENT METHODS: project
TEACHER (NAME, EMAIL CONTACT): Mykhaylo Pashechko, mpashechko@hotmail.com



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Basics of WEB Technologies – P09

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: Lecture
NUMBER OF HOURS: 15	ECTS: 4
SEMESTER: summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English

PRELIMINARY REQUIREMENTS: Students knows and understands basic IT concepts. They have basic knowledge of information technology. Students uses literature and other sources of information.

CONTENTS:

1. Familiarization with the workshop regulations. Discussion on the principles of passing the laboratory. Presentation and general characteristics of the curriculum. Basics of using information technology tools and methods. Working with the operating system, advanced file operations (formatting, defragmentation, processes), folder options, folder views, types of application software.
2. The use of presentation programs in the education process. Creating multimedia presentations of educational materials. Creating and editing presentation templates. Inserting multimedia objects. Applying color schemes. Work automation.
3. Use of internet services for educational purposes. General characteristics of internet services. Types of internet browsers and search engines. Searching for information on the Internet using operators. Catalogs, databases, online content aggregators. Using the own databases of the Lublin University of Technology.
4. Methods of communicating on the network: e-mail, forums and discussion groups, network chats, instant messengers, Twitter, Blip. Creating your own e-mail account. Using programs for e-mail account, Outlook Express, Bat newsgroups). Setting up your own discussion forum. Configuring the phpBB script to create a discussion forum.
5. Multimedia teaching aids: podcast, videocast, screencast. Creating an educational screencast or videocast in the free Wink or BB FlashBack program. Publishing completed materials on your own site.
6. Remote learning platforms. Installation and configuration of the Moodle platform. Creating remote learning courses on the Moodle platform.
7. Health and safety at work at the computer. Legal regulations on the Internet and copyright. Types of software licenses.

EFFECTS OF EDUCATION PROCESS: Student:

1. understands the essence of developing documentation in teaching subjects using information technology;
2. knows the forms and methods of control and evaluation of learning outcomes;
3. understands the essence of test design and teaching quizzes using information technology tools;
4. Is able to use knowledge in designing technical tasks for the student;
5. Is able to design a technical information technology workshop;
6. Is aware of the need for constant self-education in the teaching profession.

LITERATURE (OPTIONAL): Brad Smith, Tools and Weapons: The Promise and the Peril of the Digital Age, Hardcover, 2019.

TEACHING METHODS: Lecture

ASSESSMENT METHODS: Final test or three multimedia presentations

TEACHER (NAME, EMAIL CONTACT): Robert Lis, Robert.lis@pollub.pl



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Calculus – P18

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture + class
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter/summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basic mathematical knowledge
CONTENTS: concepts of functions, limits and continuity, differentiation rules, applications of derivatives, techniques of integration
EFFECTS OF EDUCATION PROCESS: acquiring basic concepts, facts and methods in the field of the differential and integral calculus, developing skills in the mathematical reasoning, solving problems related to the mathematical analysis
LITERATURE (OPTIONAL): C. L. Mett, J. C. Smith, Calculus with applications, New York [etc.] : McGraw-Hill Book Company, 1985 A. Howard, Calculus with analytic geometry, New York : John Wiley & Sons, 1989 O. Hijab, Introduction to Calculus and Classical Analysis, Springer-Verlag, New York, 1966
TEACHING METHODS: lecture, solving exercises
ASSESSMENT METHODS: homework, written exam
TEACHER (NAME, EMAIL CONTACT): Magdalena Jastrzębska, m.jastrzebska@pollub.pl



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Complex analysis – P19

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture + class
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter/summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: calculus
CONTENTS: complex sequences and series, analytic functions, Cauchy's Theorem, residue calculus, harmonic functions
EFFECTS OF EDUCATION PROCESS: acquiring basic concepts, facts and methods in the field of the complex analysis, developing skills in the mathematical reasoning, solving problems related to the complex analysis
LITERATURE (OPTIONAL): L.V.Ahlfors, Complex Analysis, 3rd edition, McGraw Hill, 2000 J.E. Marsden and M. J. Hoffman, Basic Complex Analysis, 3rd edition, W.H. Freeman, 1999. H.A.Priestley, Introduction to Complex Analysis, 2nd edition (Indian), Oxford, 2006.
TEACHING METHODS: lecture, solving exercises
ASSESSMENT METHODS: homework, written exam
TEACHER (NAME, EMAIL CONTACT): Anna Futa, a.futa@pollub.pl



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Econometrics – P03

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: Mathematical class
NUMBER OF HOURS: 15	ECTS: 4
SEMESTER: summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: matrix analysis, matrix equations
CONTENTS: 1. Pointwise and periodical prognosis 2. Temporary series 3. Estimation of linear and nonlinear models parameters
EFFECTS OF EDUCATION PROCESS: Understanding the method of least squares, Hellwig's method, calculating of correlation coefficient
LITERATURE (OPTIONAL): „A Guide to Econometrics” Peter Kennedy, „Econometrics” Fumio Hayashi, Princeton University Press, „Introduction to Econometrics” Christopher Dougherty
TEACHING METHODS: Working on computers, lecture of theory, practical exercises
ASSESSMENT METHODS: Examination
TEACHER (NAME, EMAIL CONTACT): Anna Makarewicz, a.makarewicz@pollub.pl



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Electronics – P04

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: tutorial
NUMBER OF HOURS: 30	ECTS: 4
SEMESTER: winter/summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS:
CONTENTS: Semiconductors: diode, bipolar transistor, operational amplifier. Rectifier. AC/DC Power Adapter. Power amplifier. Function generator. Logic gates, flip-flops. Microprocessor architecture.
EFFECTS OF EDUCATION PROCESS: Students can apply fundamental electrical circuit's laws to design and measure simply electronic device
LITERATURE (OPTIONAL): Kuphaldt T.R., 2009 Lessons In Electric Circuits. Volume III – Semiconductors. full text access http://openbookproject.net/electricCircuits/
TEACHING METHODS: tutorial in lab.
ASSESSMENT METHODS: exercise evaluation, class test
TEACHER (NAME, EMAIL CONTACT): Michał Charlak, m.charlak@pollub.pl



Graph Theory – P05

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture + auditorials
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter/summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS:
CONTENTS: fundamentals of graph theory: connectivity, trees, minimal spanning trees, shortest paths, Euler and Hamilton cycles, planarity, colorings
EFFECTS OF EDUCATION PROCESS: recognizing basic properties of graphs, constructing minimal spanning trees and shortest paths, recognizing planar graphs, ability of applying vertex and edge colorings of graphs
LITERATURE (OPTIONAL): G. Chartrand, L. Lesniak, P. Zhang, Graphs and digraphs, CRC, 2011
TEACHING METHODS: lecture, solving exercises
ASSESSMENT METHODS: written exam
TEACHER (NAME, EMAIL CONTACT): Izolda Gorgol, i.gorgol@pollub.pl



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Introduction to Data Analysis – P15

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basic knowledge in probability, basic computer skills
CONTENTS: mathematical statistics, design of experiment, multidimensional data exploration, data mining
EFFECTS OF EDUCATION PROCESS: point estimation, testing parametric and nonparametric hypotheses, sampling designs, linear and nonlinear models, feature selection, multidimensional scaling, cluster analysis, regression and classification models
LITERATURE (OPTIONAL): : M.Khun, K. Johnson, Applied predictive modeling, Springer, 2013, S.J. Sheather, A modern approach to regression with R, Springer, 2009, T. Raykov, G. A. Marcoulides, Basic statistics, An introduction with R, Rowman & Littlefield, 2013
TEACHING METHODS: lecture/consultations
ASSESSMENT METHODS: project
TEACHER (NAME, EMAIL CONTACT): Dariusz Majerek (d.majerek@pollub.pl)



Introduction to functional analysis – P14

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture+class
NUMBER OF HOURS: 15	ECTS: 4
SEMESTER: winter/summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basis mathematical analysis
CONTENTS: inner product, norm, metric, Hilbert space, Banach space, bounded and linear operator and functionals on normed spaces
EFFECTS OF EDUCATION PROCESS: the students can apply the concepts and method described in syllabus
LITERATURE (OPTIONAL):
TEACHING METHODS: lecture, solving exercises during classes and homework
ASSESSMENT METHODS: homework, exercise evaluation and exam
TEACHER (NAME, EMAIL CONTACT): PhD Renata Buczko, r.rososzczuk@pollub.pl



Linear Algebra – P07

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture+class+discussion
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter/summer	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basic mathematical concepts and notations
CONTENTS: : complex numbers; matrix algebra; determinants; systems of linear equations; vector spaces, linear independence, basis and dimension; linear transformations; eigenvectors and eigenvalues; diagonalization
EFFECTS OF EDUCATION PROCESS the students will be able to apply the concepts and methods described in the syllabus and will be able to solve different mathematical problems using linear algebra
LITERATURE (OPTIONAL):) S. J. Axler, <i>Linear Algebra Done Right</i> , Springer-Verlag; D. H. Griffel, <i>Linear Algebra and Its Applications</i> , Chichester: Ellis Horwood Limited; D. C. Lay, <i>Linear Algebra and Its Applications</i> , Addison Wesley; S. J. Leon, <i>Linear Algebra with Applications</i> , Pearson Prentice Hall; D. Poole, <i>Linear Algebra: A Modern Introduction</i> , Brooks/Cole
TEACHING METHODS: lecture, solving exercises
ASSESSMENT METHODS: homework, written exam
TEACHER (NAME, EMAIL CONTACT): Ewa Łazuka, e.lazuka@pollub.pl



Mathematical foundations of life insurance – P08

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lectures and practical classes
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: summer	CLASS LEVEL: bachelor/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: differential and integral calculus, probability theory (discrete and continuous random variables)
CONTENTS: demographic models, life tables, typical life insurance policies and their actuarial values, life annuities, premiums, losses and reserves
EFFECTS OF EDUCATION PROCESS: student knows the concept of future lifetime as a random variable, student knows analytical laws of mortality, student knows life tables based model of mortality, student is able to apply methods of calculating actuarial values (also with commutation function), student is able to calculate premium and reserves
LITERATURE (OPTIONAL): N.L. Bowers, H.U. Gerber, J.C. Hickman, D.A. Jones, C.J. Nesbitt, <i>Actuarial Mathematics</i> , The Society of Actuaries 1997
TEACHING METHODS: lectures by teacher, textbook assignments, problem solving
ASSESSMENT METHODS: recognition of course work, written and oral examinations
TEACHER (NAME, EMAIL CONTACT): PAWEŁ WLAŹ, p.wlaz@pollub.pl



Random processes – P10

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture + class + discussion
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter/summer	CLASS LEVEL: bachelor/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basic mathematical concepts and notations probability theory
CONTENTS: random experiments; probability axioms; conditional probability; random variables; characteristic functions; random vectors; discrete-time and continuous-time Markov chains; Brownian motion; Introduction to Simulation Using MATLAB; Markov and semi- Markov processes
EFFECTS OF EDUCATION PROCESS: the students will be able to apply the concepts and methods described in the syllabus and will be able to solve different mathematical problems using methods of the random processes.
LITERATURE (OPTIONAL): <ol style="list-style-type: none">1. S.M. Ross. Applied Probability Models with optimization Applications. Dover Publications.2. Hwei P. Shu. Probability, Random variables and Random Processes. Schaum's Outlines. McGraw-Hill,3. Jacod J., Shiryaev A. N. Limit Theorems for Stochastic Processes. Springer-Verlang,4. Korolyuk V. S., Limnios N. Stochastic Systems in Merging Phase Space :World Scientific Publishing,
TEACHING METHODS: lecture, solving exercises
ASSESSMENT METHODS: homework, written exam
TEACHER (NAME, EMAIL CONTACT): Yaroslav Chabanyuk, y.chabanyuk@pollub.pl



Selected problems in applied computer science – P11

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: tutorial
NUMBER OF HOURS: 15	ECTS: 4
SEMESTER: winter	CLASS LEVEL: bachelor

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS:
CONTENTS: Heat and mass transfer. Heat generation, combustion processes, fuels, boilers. Electric current and its energy. Conversion from mechanical energy to electric current. Conversion from heat to electric energy. Cogeneration of heat and current. Conversion from light to electric current. Conversion from light to heat. Fuel cells and unconventional energy sources
EFFECTS OF EDUCATION PROCESS: Students can apply freeware CAD software to solve simple energy generation problems
LITERATURE (OPTIONAL): Encyclopedia of Energy. full text access http://www.sciencedirect.com Encyclopedia of energy / edit. in chief: Cutler J. Cleveland. {Amsterdam} : Elsevier, [cop.] 2008 Encyclopedia of energy engineering and technology. Vol. 1-3 / ed. by Barney L. Capehart. Boca Raton [etc.] : CRC Press Taylor & Group, cop. 2007
TEACHING METHODS: tutorial in computer lab.
ASSESSMENT METHODS: computer exercise evaluation, class test
TEACHER (NAME, EMAIL CONTACT): Magdalena Pańnikowska-Łukaszuk, m.pasnikowska-lukaszuk@pollub.pl



Selected problems in engineering – P16

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture (15) + laboratory(15)
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: summer	CLASS LEVEL: master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS:
CONTENTS: Heat transfer calculation procedure. WUFI application, heat transfer coefficient, heat demand. Hot water demand, energy demand, boiler selection , ESOP application. Solar domestic hot water system in building design, ESOP application.
EFFECTS OF EDUCATION PROCESS: Students can apply ESOP software to design an integrated system to supply energy.
LITERATURE (OPTIONAL): Encyclopedia of Energy. full text access http://www.sciencedirect.com Encyclopedia of energy / edit. in chief: Cutler J. Cleveland.[Amsterdam] : Elsevier, [cop.] 2008 Duffie J.A., Beckman J.A., 1991 Solar Engineering of Thermal Processes. John Wiley and Sons, New York
TEACHING METHODS: lecture, tutorial in computer lab.
ASSESSMENT METHODS: computer exercise evaluation, class test
TEACHER (NAME, EMAIL CONTACT): Dorota Wójcicka-Migasiuk , d.wojcicka-migasiuk@pollub.pl (lecture) Magdalena Paśnikowska-Łukaszuk, m.pasnikowska-lukaszuk@pollub.pl (laboratory)



FACULTY OF FUNDAMENTALS OF TECHNOLOGY - LUBLIN UNIVERSITY OF TECHNOLOGY PL LUBLIN03

Selected problems in engineering – P17

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture
NUMBER OF HOURS: 15	ECTS: 4
SEMESTER: summer	CLASS LEVEL: master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS:
CONTENTS: Heat transfer calculation procedure. WUFI application, heat transfer coefficient, heat demand. Hot water demand, energy demand, boiler selection , ESOP application. Solar domestic hot water system in building design, ESOP application.
EFFECTS OF EDUCATION PROCESS: Students can apply ESOP software to design an integrated system to supply energy.
LITERATURE (OPTIONAL): Encyclopedia of Energy. full text access http://www.sciencedirect.com Encyclopedia of energy / edit. in chief: Cutler J. Cleveland.[Amsterdam] : Elsevier, [cop.] 2008 Duffie J.A., Beckman J.A., 1991 Solar Engineering of Thermal Processes. John Wiley and Sons, New York
TEACHING METHODS: lecture
ASSESSMENT METHODS: class test
TEACHER (NAME, EMAIL CONTACT): Dorota Wójcicka-Migasiuk , d.wojcicka-migasiuk@pollub.pl



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Selected problems in technology – P12

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: tutorial
NUMBER OF HOURS: 15	ECTS: 4
SEMESTER: summer	CLASS LEVEL: master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS:
CONTENTS: Renewable energy sources. Thermal collectors, photovoltaic cells and systems. Wind power generation. Biofuels and combustion. Geothermal energy systems and their examples of realization. Ground collectors and heat pumps. Fuel cells
EFFECTS OF EDUCATION PROCESS: Students can apply freeware CAD software to design an integrated system to supply energy
LITERATURE (OPTIONAL): Encyclopedia of Energy. full text access http://www.sciencedirect.com Encyclopedia of energy / edit. in chief: Cutler J. Cleveland.[Amsterdam] : Elsevier, [cop.] 2008 Duffie J.A., Beckman J.A., 1991 Solar Engineering of Thermal Processes. John Wiley and Sons, New York
TEACHING METHODS: tutorial in computer lab.
ASSESSMENT METHODS: computer exercise evaluation, class test
TEACHER (NAME, EMAIL CONTACT): Magdalena Paśnikowska-Łukaszuk, m.pasnikowska-lukaszuk@pollub.pl



FACULTY OF FUNDAMENTALS OF TECHNOLOGY - LUBLIN UNIVERSITY OF TECHNOLOGY PL LUBLIN03

Selected topics of financial mathematics – P13

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: seminar
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: winter/summer	CLASS LEVEL: bachelor/master/PhD

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Knowledge of calculus II and basic probability theory
CONTENTS: Types of accumulation and discounting; Basic annuities; The term structure of interest rates; Types of interest rates; Fundamental categories of derivatives; FRA contracts; IRS contracts; Futures and Forward; Stock options; Binomial models.
EFFECTS OF EDUCATION PROCESS: The student knows and understands: notions of accumulation and discounting and types of them, the dependence of the term structure of the type of the accumulation process, types of annuities, types of interest rates. The student knows and understands notions and properties of basic derivatives. The student knows and understands the structure of FRA and IRS contracts and also he knows the methods of valuation of those contracts. The student knows and understands Futures and Forward contracts and stock options. The student knows and understands the binomial models: one-step and multi-step as well as methods of valuation of derivatives and the algorithm of the valuation of the contract with use of binomial tree. The student is able to: utilize the notions of nominal and effective interest rates and the relation between the term structure of interest rates and the type of the accumulation process, use the notion of the annuity and apply the appropriate types of annuities to determine the present and future value of the capital and loan, use derivatives related notions and apply the properties of basic derivatives, apply FRA, IRS, Future and Forward contracts in basic investment strategies, perform the valuation of the derivative instrument with use of the binomial models.
LITERATURE (OPTIONAL): Hull J.C., <i>Options, Futures & Other Derivatives</i> , Prentice Hall, 2002; Kellison S.G., <i>The Theory of Interest</i> , McGraw-Hill, 1991
TEACHING METHODS: Seminar
ASSESSMENT METHODS: The student presents main theoretical concepts and ideas and solves the problems.
TEACHER (NAME, EMAIL CONTACT): Janusz Szuster, j.szuster@pollub.pl