



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

in academic year 2018/19*

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	Computer aided technique	II	30	dr inż. Sylwester Korga	4
P02	Data mining in finance	II	30	mgr inż. Wojciech Rosa	6
P03	Econometrics	II	15	dr Anna Makarewicz	4
P04	Electronics	I, II	30	dr inż. Michał Charlak	4
P05	Graph theory	I,II	30	dr Izolda Gorgol	6
P06	Information technology	I	30	mgr inż. Wojciech Rosa	4
P15	Introduction to Data Analysis	II	30	dr Dariusz Majerek	6
P14	Introduction to functional analysis	I,II	15	dr Renata Rososzczuk	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	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. PL mgr inż. Magdalena Paśnikowska- Łukaszuk	6
P17	Selected problems in engineering (lecture)	II	15	dr hab. Inż. Dorota Wójcicka-Migasiuk, prof. PL	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 2018/19, 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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Computer aided technique – P09

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

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basic Knowledge - programming
CONTENTS: Environment Basics – learn the most important building blocks for any Labview application, including the front panel, block diagram, palettes, controls, and indicators. Graphical Programming Basic – see how to connect functions and work with a variety of data types when constructing applications. Common Tools – view a collection of important tools and common user functions that all users should be familiar with. Debugging Tools – learn how to use simple tools and techniques to understand the behavior of code and address problems or bugs
EFFECTS OF EDUCATION PROCESS: ability to create programs for engineers
LITERATURE (OPTIONAL): www.ni.com
TEACHING METHODS: computer lab and exercise
ASSESSMENT METHODS: assessment for the project-execution of engineering program
TEACHER (NAME, EMAIL CONTACT): Sylwester Korga, s.korga@pollub.pl



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Data Mining in Finance – P02

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

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basic math, basic statistics
CONTENTS: Lectures about using data mining methods applied in finance.
EFFECTS OF EDUCATION PROCESS: student will be familiar with data mining methods and their applications in finance, using computer tools to analyze finance data.
LITERATURE (OPTIONAL):
TEACHING METHODS: lecture, presentation
ASSESSMENT METHODS: exam
TEACHER (NAME, EMAIL CONTACT): Wojciech Rosa, w.rosa@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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Information Technology – P06

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

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basic knowledge of computer science
CONTENTS: generating text documents (a basic structure of a source file, fundamentals of coding formulas, defining new commands) and creating a multimedia presentation in the Latex system
EFFECTS OF EDUCATION PROCESS: understanding the basic question of programming in the Latex system, creating documents and multimedia presentations according to principles of the Latex system
LITERATURE (OPTIONAL): Leslie Lamport, A document preparation system - LATEX. User's guide and reference manual.
TEACHING METHODS: working with educational documents prepared for laboratories, analysing theoretical and practical questions related to the Latex system
ASSESSMENT METHODS: final test verifying a working knowledge of basic commands in the Latex system, grade for the multimedia presentation prepared in class.
TEACHER (NAME, EMAIL CONTACT): Wojciech Rosa, w.rosa@pollub.pl



Introduction to Data Analysis – P15

FACULTY: Faculty of Fundamentals of Technology	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 6
SEMESTER: summer	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, solving exercises
ASSESSMENT METHODS: written exam
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 Rososzczuk, 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 Paśnikowska-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)



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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



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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