Courses available at the Faculty of Electrical Engineering and Computer Science

2018/2019

REMARKS:

1. Duration of all courses is 1 semester.
2. Semester: winter and/or summer means that the same course repeats in winter and summer semester. Otherwise in the indicated semester ONLY.
3. The applying student can select up to 32 ECTS per semester.
4. Up to 33% of subjects specified in Learning Agreement (LA) can be subjects offered by the other faculties of the Lublin University of Technology.
5. Upon arrival the student is entitled to change up to 33% of subjects listed in his/her Learning Agreement (LA). The “During the mobility” form must be delivered to the Coordinator no later than 14 days after the organizational meeting.
6. When the number of students applying for a course is less than specified in the catalogue, the faculty will have the right to cancel the course. In this case the student should amend his/her Learning Agreement.

Last update: 2018-02-27

COURSE CODE: E001

Advanced Energy Sources

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: basics of chemistry and physics
CONTENTS: Introduction of the laboratory and subject. Energy resources- general evaluation, Energy from non-renewable resources: coal, petroleum, natural gas, methane hydrates. Nuclear Energy: fusion, fission. Energy from renewables: geothermal energy. Hydropower. Solar energy. Wind energy. Solar and wind architecture.
Energy from biomass, biofuels. Hydrogen fuel cells, batteries, energy efficient devices, electrical grid.
EFFECTS OF EDUCATION PROCESS: Students will gain basic knowledge about generation of energy from variety of resources. Simple problems related to availability of resources, efficiency, economical, societal and ecological aspects of energy generation will be analysed.
LITERATURE: 1. . Ghosh, M. Prelas “Energy Resources and Systems: Volume 2: Renewable Resources”, [ED:] R. Rugescu “Solar power”
TEACHING METHODS: Lecture
ASSESSMENT METHODS: Activity in the class, oral presentation, panel presentation, report and attendance.
TEACHER: Joanna Pawłat, j.pawlat@pollub.pl

COURSE CODE: E003

Algebra

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and discussion
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Essentials of high school algebra
CONTENTS: Complex numbers, polynomials, matrices and determinants, systems of linear equations,
analytic geometry (including planes and straight lines in Euclidean space), conic sections (circle, ellipse, parabola and hyperbola),
eigenvalues and eigenvectors.
EFFECTS OF EDUCATION PROCESS: Learning and understanding basic concepts of algebra.
LITERATURE: 1. Janich K. – Linear Algebra, Springer-Verlag, 1994. 2. Vaisman I. – Analytical Geometry, World Scientific, 1997.
TEACHING METHODS: “lecture-discussion” format
ASSESSMENT METHODS: 40% - Final Exam, 60% - Homework
TEACHER: Ernest Nieznaj, e.nieznaj@pollub.pl

COURSE CODE: E041

Applications of optoelectronics

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: lecture, laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Fundamentals of optoelectronics, Fundamentals of metrology.
CONTENTS: Waveguide transducers and sensors. Definitions. Classification of waveguide sensors. Light modulators for waveguide sensors. Bulk modulators. Planar modulators. Fiber optic modulators. Fiber optic sensors. Intensity based sensors. Reflective sensors. Transmission loss sensors. Bending loss sensors. Interferometric sensors. Modal interferometric sensors. Methods of detecting signals from interferometric sensors. Homodyne detection. Heterodyne detection. White light interferometric sensors. Fiber Bragg grating sensors. Types of fiber Bragg gratings. Fiber Bragg gratings as measurement transducers. Optical wavelengths demodulators for fiber Bragg grating sensors. Fiber Bragg grating laser sensors. Multipoint and distributed sensors. Distributed sensors using Rayleigh scattering. Raman and Brillouin based distributed sensors. Measuring systems for distributed sensors. Optical time-domain reflectometers. Coherent optical time-domain reflectometers. Optical frequency domain reflectometers. Multipexing fiber optic sensors. Time division multiplexing. Wavelength division multiplexing. Code division multiplexing. Coherence multiplexed sensors
EFFECTS OF EDUCATION PROCESS: knowledge of the principle of operation, metrological parameters, application and methods of designing the most widely used fiber optic and integrated optic sensors and measuring systems
LITERATURE
TEACHING METHODS: lecture, laboratory experiments
ASSESSMENT METHODS: reports from laboratory experiments, oral exam.
TEACHER: Cezary Kaczmarek, c.kaczmarek@pollub.pl

COURSE CODE: E004

Automatics and Automatic Control 1

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: lecture/laboratory
NUMBER OF HOURS: 30+30 (lecture + laboratory)	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Linear algebra
CONTENTS: **Introduction to automatics** – short history, control system and related nations, classification of control systems, **System models** – differential equations, state equations, Linearization of models, Laplace transform, transfer function, **Time responses –** impulse and step response, **Frequency responses –** Nyquist plot, Bode plots, **Basic dynamics elements –** first order system, integrator, differentiator, second order systems, systems with delay, **Structure of control system** – examples of control systems, description of closed-loop systems, **Closed loop system stability** – Hurwitz criterion, Nyquist criterion, **Quality of control** – analyses of steady state, method based on roots placement, method based on integral indices, **Compensators and regulators** - PID controller, **PID controller parameters tuning** – Ziegler-Nichols methods, Chien, Hrones and Reswick methods.
EFFECTS OF EDUCATION PROCESS: Students will gain knowledge about structure and functionality of open- and closed-loop control systems. Students will have ability to analyse and design of simple control systems.
LITERATURE: 1. . Gessing R., Control fundamentals, Wyd. Politechniki Śląskiej, Gliwice 2004
TEACHING METHODS: *Lecture + laboratory exercises*
ASSESSMENT METHODS: Oral/written examination
TEACHER: Adam Kurnicki, a.kurnicki@pollub.pl

COURSE CODE: E005

Automatics and Automatic Control 2

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: Lecture/Laboratory
NUMBER OF HOURS: 30+30 (lecture + laboratory)	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Automatics and Automatic Control I
CONTENTS: ***Discrete-time functions and Z transform –*** *properties of Z-transform, Inverse Z-transform*, ***Systems with sampling, Discrete-time transfer function, Closed-loop system description using discrete-time transfer function, Closed-loop discrete-time systems stability analyses, Design of discrete-time regulators*** *- digital realization of PID controllers,* ***Analysis and construction of binary circuits –*** *boolean algebra, logic gates,* ***Combinational Circuit design –*** *simplification of Boolean expressions, function minimization methods,* ***Sequential system design –*** *Huffman method, flip-flop circuits.*
EFFECTS OF EDUCATION PROCESS: Students will gain knowledge about structure and functionality of digital control systems. Students will have ability to analyse and design of simple digital control systems.
LITERATURE:.
TEACHING METHODS: *Lecture + laboratory exercises*
ASSESSMENT METHODS: Oral/written examination
TEACHER: Adam Kurnicki, a.kurnicki@pollub.pl

COURSE CODE: E006

Basic applied mathematics and modelling in biology 1

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	Minimum number of students required to start: 15

PRELIMINARY REQUIREMENTS: calculus, discrete mathematics, probability theory

CONTENTS:

1. Modeling molecular evolution.

We describe evolutionary changes on the molecular level, main forces responsible for such evolution and the results of their influence on genomes, genes and their products.

Main points: dynamic of genes' populations, Hardy-Weinberg law, selection, dominant selection, stabilizing selection, genetic drift, Wright-Fisher model, Kingman's coalescent, phylogenetic trees, constructing phylogenetic trees, phylogenetic distances, mutations, infinitely many sites model, infinitely many alleles model.

2. Modeling population size.

We offer an introduction to classical models of population dynamics, stressing their diversity issuing from variety of needs, tools and points of view of their authors.

Main points: Fibonacci sequence, discrete and continuous versions of the Malthus and logistic equations, competition and symbiosis, Lotka-Volterra equations, age-structured populations: discrete version of the McKendrick equation, extinction of family lines and branching processes (Galton – Watson process).

3. Other models.

A review of concepts and models originating from various branches of biology and medicine.

Topics may include: drug release, drug resistance, SIR model, the Hodgkin-Huxley equation, modeling fast neurotransmitters, the Beverton-Holt and the Ricker equation, cell cycle model with death and quiescence.

EFFECTS OF EDUCATION PROCESS: The main goal is to present basic models of mathematical biology and to discuss how mathematical models of biological phenomena are build. Mathematics is not an isolated branch of science; rather, it is strongly related to other branches of science. Although it may and does develop by itself, mathematics is often inspired by other branches of science, including biology, in a crucial manner. On the other hand, mathematical tools and techniques are often indispensable in dealing with challenges from applied sciences, and modeling biological phenomena requires both ingenuity and solid mathematical knowledge. This is the first part of the COURSE CODE: E040it is devoted to models requiring methods of graph theory, difference equations, ordinary differential equations and discrete-time Markov chains.
LITERATURE: 1. E. S. Allman, J.A. Rhodes, Mathematical models in biology. Cambridge, 2004. 2. J. Banasiak, Modelling with difference and differential equations, Cambridge, 2010. 3. G. Fullford, P. Forrester, A. Jones, Modelling with difference and differential equations, Cambridge, 1997. 4. D. Graur, W.-H. Li, Fundamentals of molecular evolution. Sinauer Associates, 2000. 5. P. Jagers, Branching processes with biological applications. Wiley, 1975. 6. L. S. Allen, An introduction to stochastic processes with applications to biology, Pearson, 2010. 7. R. Durret, Probability models for DNA sequence evolution, Springer, 2002. 8. J. Hein, M. H. Schierup, C. Wiuf., Gene genealogies, variation and evolution. A primer in coalescent theory. Oxford, 2006. 9. M. Kimmel, D. E. Axelrod, Branching processes in biology. Springer, 2002. 10. H. R. Thieme, Mathematics in Population Biology, Princeton, 2003.
TEACHING METHODS: lecture
ASSESSMENT METHODS: mid-term exams, home-work, final exam.
TEACHER: Adam Bobrowski, a.bobrowski@pollub.pl

COURSE CODE: E007

Basic applied mathematics and modelling in biology 2

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	Minimum number of students required to start: 15

PRELIMINARY REQUIREMENTS: Basic applied mathematics and modeling in biology I

CONTENTS:

1. Deterministic models.

A review of chosen equations and systems of equations describing biological phenomena. Main subjects: Population dynamic, McKendrick-type equations, dynamics of sola sola populations, diffusion equations and pattern formation, reaction diffusion equations, chemotaxis.

2. Stochastic models.

A review of various classes of stochastic processes, stressing their role in modeling biological phenomena, and biological, genetical and medical problems that influenced their emergence and development.

Main subjects: modeling mutations with Markov chains (infinitely many alleles model, modeling miscrosatelites evolution with mutations and catastrophes) branching processes in biology, Brownian motion, diffusion processes, Wright's diffusion, boundary conditions for stochastic processes (signaling pathways, kinase activity model), Poisson process, genetic drift, coalescence, modeling mutations with point processes (infinitely many sites model), piece-wise deterministic processes and models of gene expression and gene regulation.

EFFECTS OF EDUCATION PROCESS:

The main goal is to present basic models of mathematical biology and to discuss how mathematical models of biological phenomena are build. Mathematics is not an isolated branch of science; rather, it is strongly related to other branches of science. Although it may and does develop by itself, mathematics is often inspired by other branches of science, including biology, in a crucial manner. On the other hand, mathematical tools and techniques are often indispensable in dealing with challenges from applied sciences, and modeling biological phenomena requires both ingenuity and solid mathematical knowledge. The is the second part of the COURSE CODE: E040it covers more up-to-date models, requiring more advanced tools.

LITERATURE:

1. L. S. Allen, An introduction to stochastic processes with applications to biology, Pearson, 2010.
2. R. Durret, Probability models for DNA sequence evolution, Springer, 2002.
3. Ewens, W.J. Mathematical Population Genetics, wydanie drugie, Springer, 2004.
4. J. Hein, M. H. Schierup, C. Wiuf., Gene genealogies, variation and evolution. A primer in coalescent theory. Oxford, 2006.

5. R. Hoyle, Pattern formation. An introduction to methods. Cambridge, 2006.
6. M. Kimmel, D. E. Axelrod, Branching processes in biology. Springer, 2002.
7. J. D. Murray, Wprowadzenie do biomatematyki, Wydawnictwo Naukowe PWN, 2006.
8. J. D. Murray, Mathematical biology, wydanie drugie, Springer, 1993.
9. C. H. Taubes, Modeling differential equations in biology. Wydanie drugie, Cambridge, 2008.
10. H. R. Thieme, Mathematics in Population Biology, Princeton, 2003.
11. R. Rudnicki, Modele i metody biologii matematycznej. Część I: modele deterministyczne. To appear in PWN.

TEACHING METHODS: lecture

ASSESSMENT METHODS: mid-term exams, home-work, final exam.

TEACHER: Adam Bobrowski, a.bobrowski@pollub.pl

COURSE CODE: E008

C programming

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	Minimum number of students required to start: 5

PRELIMINARY REQUIREMENTS: Knowledge of any other programming language
CONTENTS: Presentation of the laboratory curriculum and principles of the coursework assessment. Material consolidation on C programming: variable types, control statements, arrays, structures, pointers, functions, dynamic memory allocation, files and input output operations. Final coursework assessment.
EFFECTS OF EDUCATION PROCESS: Acquainting students with basics of C programming language. Learning the skills of using C capabilities.
LITERATURE: 1. Kernighan Brian W., Ritchie Dennis M., The C Programming Language, Second Edition, Prentice Hall, Inc., 1988. 2. Steve Oualline, Practical C Programming, 3rd Edition, O'Reilly 1997
TEACHING METHODS: theory – lecture, practice - laboratory
ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - final project)
TEACHER: Jerzy Montusiewicz, *j.montusiewicz@pollub.pl*

LIST OF COURSES

COURSE CODE: E009

Calculus 1

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and discussion
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Essentials of high school calculus
CONTENTS: Functions and their representations. Inverse Functions. The limit of a Function. Calculating limits. Continuity. Limits involving infinity. Asymptotes. Derivatives and rates of change. Derivative as a function. Basic differentiation formulas. The product and quotient rules. The chain rule. Indeterminate forms and l'Hôspital's rule. Maximum and minimum values. The mean value theorem. Sketching the graph of a function. Curve sketching with asymptotes. Taylor polynomials. Implicit differentiation. Infinite series. The comparison test. The integral test. Alternating series. Absolute convergence. The ratio and root tests. Power series. Taylor and Maclaurin series. Trigonometric series.
EFFECTS OF EDUCATION PROCESS: This course introduces students to ideas and techniques of differentiation and integration, and applying these concepts to engineering and computer science problems.
LITERATURE: 1. J. Stewart, Calculus, Thomson Learning Inc. 2008 2. A. Zygmund, R. A. Fefferman, Trigonometric series. Vol. I, Cambridge University Press 2002
TEACHING METHODS: lecture, class discussion
ASSESSMENT METHODS: weekly homework assignments, a final exam.
TEACHER: Małgorzata Murat m.murat@pollub.pl

COURSE CODE: E010

Calculus 2

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and discussion
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Essentials of Calculus 1
CONTENTS: Functions of several variables, partial derivatives , tangent plane, gradient, local extrema and saddle points, multiple, line and surface integrals (Green's formula, Gauss-Ostrogradsky theorem) and its applications.
EFFECTS OF EDUCATION PROCESS: Learning and understanding main concepts of advanced calculus.
LITERATURE: 1. Ghordape S. R., Limaye B.V. – A course in multivariable calculus and analysis, Springer, 2010. 2. Apostol T.M. – Calculus, Vol. 2, Wiley, 1969.
TEACHING METHODS: "lecture-discussion" format
ASSESSMENT METHODS: 40% - Final Exam, 60% - Homework
TEACHER: Ernest Nieznaj, e.nieznaj@pollub.pl

COURSE CODE: E011

Circuit Theory part 1

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of mathematics and physics

CONTENTS:
Units associated with basic electrical quantities. An introduction to electric circuits. Resistance variation. Series circuits. Potential divider. Parallel networks. Current division. Resistive Circuits. Capacitors and capacitance. Magnetic circuits. Electromagnetic induction. Inductance. DC circuit theory: Kirchhoff's laws, The superposition theorem. Thevenins theorem. Norton's theorem. Maximum power transfer theorem. Alternating voltages and currents. Single-phase series AC circuits. Single-phase parallel AC circuits. DC transients (RC circuit, RL circuit). Fundamentals of Electric Circuits. . Capacitance and Inductance. Steady State DC and AC Analysis. Transient analysis.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with basics of Circuit Theory in Electrical Engineering
Learning the methods of the solution basic examples for electric and electronic circuits.

LITERATURE:

1. John Bird, Electrical Circuit Theory and Technology, Newnes, Oxford, 2003.
2. Charles K. Alexander, Matthew N.O. Sadiku, Fundamentals of Electric Circuits, McGraw-Hill Companies, New York 2009

TEACHING METHODS: theory – lecture, practice - exercises

ASSESSMENT METHODS: Final coursework assessment (100% - test)

TEACHER: Paweł Surdacki, *p.surdacki@pollub.pl*

COURSE CODE: E012

Circuit Theory part 2

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of mathematics and physics, Circuit Theory part I (recommended)
CONTENTS: Revision of complex numbers. Application of complex numbers to series AC circuits. Application of complex numbers to parallel AC networks. Power in AC circuits. Series and parallel resonance and Q-factor. Solution of simultaneous equations using determinants. Network analysis using Kirchhoff's laws. Mesh-current and nodal analysis. The superposition theorem. Thevenin's and Norton's theorems. Delta-star and star-delta transformations. Maximum power transfer theorems and impedance matching. Three phase systems: Three-phase supply, Star connection, Delta connection, Power in three-phase systems. Measurement of power in three-phase systems. Comparison of star and delta connections. Advantages of three-phase systems.
EFFECTS OF EDUCATION PROCESS: Acquainting students with basics of Circuit Theory in Electrical Engineering, Learning the methods of the solution basic examples for electric and electronic circuits.
LITERATURE: 1. John Bird, Electrical Circuit Theory and Technology, Newnes, Oxford, 2003. 2. Charles K. Alexander, Matthew N.O. Sadiku, Fundamentals of Electric Circuits, McGraw-Hill Companies,New York 2009..
TEACHING METHODS: theory – lecture, practice - exercises
ASSESSMENT METHODS: Final coursework assessment (100% - test)
TEACHER: Paweł Surdacki, *p.surdacki@pollub.pl*

COURSE CODE: E013

Computer architecture

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: None
CONTENTS: Basic computer system components, basic interactions between computer system components, hardware aspects of programming, interconnection, bus standards, memory basics, cache memory, system memory, mass storage, input/output system, programming I/O, , CPU basics, microprogramming, instruction set architectures, pipelining, superscalar architecture, application specific architectures, multiprocessor/multicore architectures.
EFFECTS OF EDUCATION PROCESS: Knowledge in hardware aspects of computer system performance. .
LITERATURE: 1. William Stallings, Computer Organization and Architecture,6th Ed, Pearson Education Inc. (Prentice Hall), 2003,
TEACHING METHODS: lecture, project
ASSESSMENT METHODS: Final coursework assessment (60% - test, 40% - project)
TEACHER: Andrzej Smolarz, a.smolarz@pollub.pl

COURSE CODE: E014

Computer graphics fundamentals

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Basic computer knowledge

CONTENTS:
The course covers: principles of 2D graphics (color, raster, image type, image transformations, geometry transformations, curves, tools), principles of 3D graphics (basic notions, 3D objects, transformations and geometry, projection, basics of lighting, models and shading, texturing of 3D objects - simple and UV coordinates), introduction to 2D animations, motion and shape animation, morphing, introduction to 3D animation - animation of position, shape, lighting, simple effects.

EFFECTS OF EDUCATION PROCESS:
Student will get acquainted with basic principles of computer graphics, starting from the definitions of color, resolution etc, digital 2D and 3D image construction, followed by explanation of simple image transformation methods and the principles of animation.

LITERATURE:

1. James D. Foley, John F. Hughes, Andries van Dam, Steven Feiner, Computer Graphics: Principles and Practice (third edition), Addison-Wesley Professional, 2013

TEACHING METHODS: theory – lecture, practice - laboratory

ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - final project)

TEACHER: Jacek Kęsik, j.kesik@pollub.pl

COURSE CODE: E015

Computer networks

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture+ laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: None
CONTENTS: Packet-switched data transmission. Computer networks standards and devices. Reference models. Network types, topologies. Structured cabling basics and standards. Physical layer. Media Access mechanisms. IEEE802 standards: Ethernet, Token Ring and FDDI networks. Wireless Networks (IEEE 802.11 and Bluetooth). The Network Layer design issues. IP protocol. Routing. Internetworking. ARP & RARP protocols. ICMP protocol. Ping program. Broadcasting & multicasting. The transport layer. The internet transport protocols TCP, UDP. Performance issues. Application layer. Dynamic Name System. DNS Resource Records; BOOTP & DHCP. Remote logon. Telnet. File Transfer Protocol. Electronic mail protocols SMTP, POP, IMAP. HTTP protocol features. Network security. The basis of SSH, SLL and IPSec. VPNs.
EFFECTS OF EDUCATION PROCESS: Knowledge in structure and protocols of computer networks on various layers. Basics of network management.
LITERATURE: 1.
TEACHING METHODS: lecture, project, laboratory
ASSESSMENT METHODS: Final coursework assessment
TEACHER: Konrad Gromaszek, k.gromaszek@pollub.pl

COURSE CODE: E016

Computer systems security

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Knowledge of computer systems security techniques
CONTENTS: Cryptography and steganography basics, Classical cryptographic methods, Chosen methods of symmetric and asymmetric cryptography, Modern cryptographic techniques, Modern steganography techniques.
EFFECTS OF EDUCATION PROCESS: Competence to adjust proper security technique to chosen applications. The knowledge about protecting IT and ICT systems.
LITERATURE: 1. B. Schneier, Applied Cryptography, John Wiley& Sons, 1996
TEACHING METHODS: theory – lecture, practice - laboratory
ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - final project)
TEACHER: Grzegorz Koziel, g.koziel@pollub.pl

COURSE CODE: E017

Data warehousing and business intelligence

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I or II
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of databases
CONTENTS: Basic terms in data warehousing and business intelligence area. BI and data warehouse systems architecture. Strategy and stages of data warehouse building. Data models in data warehouses (star, snow flake and constellation schema). ROLAP and MOLAP operations. ETL process. Dedicated tools to build the data warehouse (Oracle Warehouse Builder) and dashboards (MicroStrategy BI Modeler). Cases of BI and data warehouses implementation. SQL use in ROLAP operations (queries to the data warehouse).
EFFECTS OF EDUCATION PROCESS: The knowledge of BI concept in the contemporary business. Competence to project and to implement the database dedicated to business decision support. The knowledge and skills to build the dashboards. Knowledge and skills to explore analytical data using SQL commands.
LITERATURE: 1. Ralph Kimball, Margy Ross, Bob Becker, Joy Mundy, Warren Thornwaite, The Data Warehouse Lifecycle Toolkit. Practical Techniques for Building Data Warehouse and Business Intelligence Systems., Wiley Computer Publishing, 2008 2. William H. Inmon, Building the Data Warehouse (Fourth Edition), Wiley Computer Publishing, 2005
TEACHING METHODS: theory – lecture, practice - laboratory
ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - project evaluation of the analytical database built to support the business decisions making)
TEACHER: Piotr Muryjas, p.muryjas@pollub.pl

COURSE CODE: E018

Databases fundamentals

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Knowledge of software engineering on the basic level
CONTENTS: Basic terms in database area. The concept of relational data model. Entities and attributes. Data types in the contemporary databases. The relational databases – basic terms, normalization, operations on the data sets. Data integrity and security. Keys and indexes in databases. Transactional processing in databases. Data structure creating using SQL (CREATE TABLE statement). Data manipulations with SQL use (INSERT, UPDATE and DELETE statements). Data exploration with use of the SELECT statement (clauses DISTINCT, ORDER BY, WHERE, GROUP BY, HAVING). Subqueries – advanced form of data exploration.
EFFECTS OF EDUCATION PROCESS: Competence to project the relational database. The knowledge and skills to build and to manage the database using SQL. Knowledge of methods of data manipulation and exploration using SQL commands and the skills of their use in practise.
LITERATURE: 1. C.J. Date, An Introduction to Database Systems (8th Edition), Addison-Wesley Pub. Co., 2003 2. 2. J. Price, Oracle Database SQL 11g, Mac Graw Hill, 2007
TEACHING METHODS: theory – lecture, practice - laboratory
ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - final project)
TEACHER: Piotr Muryjas, p.muryjas@pollub.pl

COURSE CODE: E019

Digital signal processing

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Linear algebra
CONTENTS: Signals - classification, basic 1D signals. Discrete systems –examples. Properties of LTI systems (also in frequency domain). Expansion of continuous function in a series of the orthogonal function Fourier Transform (continuous) - properties. Examples of FT calculation, Sampling Theorem. Short-Time Fourier Transform, Time-frequency resolution. Heisenberg Uncertainty principle, Wavelet transformation – continuous and discrete, Multiresolution analysis. Wavelet properties, Z- transform – properties, examples, Region of Convergence. Properties of the Z- Transform. FFT algorithms – DIT (Decimation in Time) and DIF (Decimation in Frequency). Digital Filters.
EFFECTS OF EDUCATION PROCESS: Students will gain knowledge about basic properties of both digital signals and systems. Special attention is paid to signal transformations and their practical use by doing projects that would provide better understanding of lecture topics.
LITERATURE: 2. Oppenheim, Alan V.; Schafer, R. W.; and Buck, J. R. Discrete-time signal processing. Upper Saddle River, N.J.: Prentice Hall, 1999.
TEACHING METHODS: Lecture, project
ASSESSMENT METHODS: Oral/written examination + project
TEACHER: Andrzej Kotyra, a.kotyra@pollub.pl

COURSE CODE: E020

Discrete mathematics

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and discussion
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 7

PRELIMINARY REQUIREMENTS: Essentials of high school calculus and algebra.
CONTENTS: Elementary logic. Tautology or fallacy. Basic rules of reasoning. Quantifiers. Naive set theory. Operations on sets. Cartesian product. Relation and functions. Multiplication and Addition Principles. The law of inclusion-exclusion. Linear recurrence relations, solutions. Basic notions of graph theory. Directed and undirected graphs. Matrix graphs representations. Acyclic graphs and trees. Minimal spanning trees. Eulerian and Hamiltonian graphs.
EFFECTS OF EDUCATION PROCESS The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in science and engineering. This course teaches the students techniques in how to think logically and mathematically and apply these techniques in solving engineering and computer science problems.
LITERATURE: 1. K. A. Ross, C. R. B. Wright, Discrete Mathematics, Pearson Education, Inc. 2003 2. R. J. Wilson, Introduction to graph theory, Pearson Education, Inc. 1996
TEACHING METHODS: lecture, class discussion
ASSESSMENT METHODS: written final exam
TEACHER: Małgorzata Murat m.murat@pollub.pl

COURSE CODE: E021

Dispersed/Embedded Generation

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture, laboratory
NUMBER OF HOURS: 20+10 (lecture + computer laboratory)	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Power Generation, Power System Analysis (recommended but not obligatory)
CONTENTS: Introduction to Distributed Generation, Combustion Engine Generator Sets, Combustion Turbines, Photovoltaic Systems, Microturbines, Fuel Cells, Combined Heat and Power Plants (CHP), Electric Power Distribution Systems, Installation and Interconnection, Fuels, Principles of Control of Distributed Generation Systems, Economic and Financial Aspects of Dispersed Generation Systems, Modelling and Simulation of Chosen Energy Source .
EFFECTS OF EDUCATION PROCESS: Students will gain knowledge about concepts of dispersed generation and its advantages/disadvantages. At the end of the course students will have ability to analyse dispersed generation technologies and its application in real life. Students will gain ability to solve problems that occur during interconnecting dispersed sources.
LITERATURE: 1. .
TEACHING METHODS: Lecture, Case Studies
ASSESSMENT METHODS: Oral/written examination, Final project (optional)
TEACHER: Michał Wydra, m.wydra@pollub.pl

COURSE CODE: E022

Dynamic systems modelling

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Circuit Theory I and II, Ordinary differentail equations, MATLAB, SIMULINK.
CONTENTS: Introduction to modelling and numerical simulation of dynamic systems, State equations-description of the linear and nonlinear dynamic systems, Dynamic models of the Electric Circuits, Introduction to MATLAB and SIMULINK, Simulation of selected real life examples in time domain.
EFFECTS OF EDUCATION PROCESS: Students will gain knowledge about dynamic system analysis and design with the aid of the MATLAB and SIMULINK environments.
LITERATURE: 3. Matlab user guide, 4. Gear C.W.: Numerical initial value problems in ordinary differential equations. Prentice Hall N.Y. 1971., 5. Gill P., Murray W., Wright M.: Practical Optimization, Academic Press, N.Y., Harier E.., Norestt S.P., Wanner G.: Solving ordinary differential equations I – Nonstiff problems, Springer Verlag, Berlin 1987.
TEACHING METHODS Lecture with multimedia presentation and computer laboratory
ASSESSMENT METHODS: Oral/written examination, project evaluation
TEACHER: Jan Sikora, e-mail: sik59@wp.pl

COURSE CODE: E024

Electrical Machines

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Electrical engineering basics
CONTENTS: Introduction to electromechanical energy conversion – electromagnetic induction phenomena, principles of electric machines operation, efficiency and power losses, duty cycle. Introduction to transformers, construction and principle of operation, emf equation, transformation ratio. Equivalent circuit and phasor diagram, open circuit and short circuit tests, power losses and efficiency. Three phase transformer connections, parallel operation of 3-phase transformers, autotransformer. Constructional details of DC machines, emf and torque equations, methods of excitation, armature reaction. Self and separately excited generators, characteristics of separately excited, shunt and compound generators, output voltage control. Principle of operation of DC motors, characteristics of series, shunt and compound motors, starting of DC motors, speed control of DC motors. Introduction to AC machines, generation of oscillating and rotating magnetic field, emf equations. Construction details of AC induction machines, types of stator and rotor windings, winding coefficient. Principle of operation of AC induction motor, torque production, equivalent circuit, power balance. Slip ring and squirrel cage induction motors construction and characteristics, starting and speed control methods. Principle of operation of AC synchronous machines, constructional features of round rotor and salient pole machines, torque equation, equivalent circuit, phasor diagram. Characteristics of synchronous generator, synchronization with the grid, active and reactive power regulation. Salient pole synchronous motor characteristics, starting and speed regulation, permanent magnet and reluctance synchronous motors.
EFECTS OF EDUCATION PROCESS: Student is able to explain the principles of operation and construction of basic types of electrical machines. Student can identify the characteristics and performance features of transformers, DC machines, three-phase induction and synchronous machines.
LITERATURE: 1) Edwards J.D.: Electrical machines. An Introduction to principles and characteristics, Macmillan Publishing Comp., New York 2001 2) Witczak P.: *An Introductory Course on Electric Machines and Transformers*, Lodz University of Technology Press, Lodz 2015
TEACHING METHODS: Lecture
ASSESSMENT METHODS: Written examination
TEACHER: Radosław Machlarz, r.machlarz@pollub.pl

COURSE CODE: E025

Electromagnetic Field Theory 1

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of mathematics and physics

CONTENTS: 1. Introduction: brief historical background, scalars and vectors, vector algebra, coordinate systems, integrals, vector analysis, Laplace and Nabla operators, scalar and vector fields, scalar field gradient, divergence and rotation of a vector field, physical interpretations. 2. Coulomb forces and electric field intensity: electric charge, Coulomb's law, electric field intensity, charge distributions, standard charge configurations. 3. Electric flux and Gauss' law: certain experiment, electric flux, electric flux density, Gauss' law, flux density and electric field intensity, divergence, divergence of D, the del operator, the divergence theorem. 4. Work, potential and energy of electrostatic field: work in the electrostatic field, electric potential, equipotential surfaces, gradient, relationship between E and V, energy in static electric fields, electric dipole. 5. Electrostatic field in matter: electrical properties of matter, dielectrics and polarization, the relative permittivity, conductor in an electrostatic field, the electrostatic induction, dielectric strength, interface conditions, capacitance. 6. Solving electrostatic problems: equations of the electrostatic field, harmonic functions. boundary conditions, the method of separation of variables (MSV), the method of superposition, the method of images. 7. Currents and conductors: current and its density, charges in electric field, conduction current density, current distributions, continuity of current, static electroconductive field, resistance R and Ohm's law, power losses, Interface conditions, DC circuits.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with basics of Field Theory in Electrical Engineering, Learning the methods of the solution basic examples in 2D and 3D space.

LITERATURE:

1. Paweł Jabłoński: Engineering Physics –Electromagnetism. Handbook (EFE, sem. 2), Czestochowa University of Technology, 2009. (also in an electronic version)

TEACHING METHODS: theory – lecture, practice – exercises

ASSESSMENT METHODS: Final coursework assessment (100% - test)

TEACHER: Paweł Surdacki, p.surdacki@pollub.pl

COURSE CODE: E026

Electromagnetic Field Theory 2

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of mathematics and physics

CONTENTS: 8. Static magnetic field: early ideas and experiments, Biot-Savart law, magnetic field intensity, Ampère's law, curl of a vector, relationship of J and H, Stokes' theorem, comparison with the electrostatics. 9. Magnetic potentials: divergence of magnetic flux density, magnetic flux, magnetic scalar potential, magnetic vector potential, Interface conditions, magnetic screening, comparison with the electrostatics. 10. Forces and work in magnetic field: magnetic force on charged particles, magnetic force on a current element, work in magnetic field, current loop in magnetic field, comparison with the electrostatics. 11. Magnetic properties of matter: magnetic dipole: magnetization, the relative permeability, magnetic properties of matter paramagnetism, diamagnetism, ferromagnetism, comparison with the electrostatics. 12. Inductance and magnetic energy: inductance, mutual inductance, magnetic coupling, magnetic circuits, energy in magnetic field, comparison with the electrostatics. 13. EMF and induced electric field: magnetic force and motional EMF , Faraday's law, EMF of transformation in coils, total electric field. 14. Electromagnetic field: displacement current, Maxwell's equations interface conditions, power and the Poynting vector, electromagnetic waves, A-V formulation. 15. Time harmonic electromagnetic field – selected phenomena: time harmonic dependency field equations for phasors, plane electromagnetic wave, eddy currents, skin effect, proximity effect.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with basics of Field Theory in Electrical Engineering, Learning the methods of the solution basic examples in 2D and 3D space.

LITERATURE:

1. Paweł Jabłoński: Engineering Physics –Electromagnetism. Handbook (EFE, sem. 2), Czestochowa University of Technology, 2009. (also in an electronic version)

TEACHING METHODS: theory – lecture, practice – exercises

ASSESSMENT METHODS: Final coursework assessment (100% - test)

TEACHER: Paweł Surdacki, p.surdacki@pollub.pl

COURSE CODE: E027

Electronic circuits

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture + laboratory/project
NUMBER OF HOURS: 60 (30 lecture, 30 practise)	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I/II
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 10

PRELIMINARY REQUIREMENTS: Advanced knowledge in electronics
CONTENTS: Analog Circuits: Transistor amplifiers, Operational amplifiers and their applications, analog filters, nonlinear circuits - limiters, rectifiers, analog to digital interface, Digital circuits: combinatory logic, latches, registers, counters, automats. Technologies Design and laboratory tests of chosen circuits
EFFECTS OF EDUCATION PROCESS: Knowledge in operation principles of analog and digital electronic circuits. Knowledge in basics of electronic circuit design.
LITERATURE: 1.
TEACHING METHODS: lecture, project
ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - project)
TEACHER: Andrzej Smolarz, a.smolarz@pollub.pl

COURSE CODE: E028

Electronics fundamentals

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture+laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Knowledge in electrical circuits, basic knowledge in solid-state physics
CONTENTS: Semiconductors; Diodes: model, applications, Zener; Transistors - bipolar: polarization, large-signal model, graphical analysis, small-signal model; Operational amplifiers: differential amplifier, properties of ideal op.amp. and real op amp, linear and non-linear applications; Digital electronics fundamentals (arithmetic, coding, gates, registers, counters, automats, memory, technologies.
EFFECTS OF EDUCATION PROCESS: Knowledge in basic electronic components and circuits operation.
LITERATURE:
TEACHING METHODS: lecture, Laboratory, project
ASSESSMENT METHODS: Final coursework assessment
TEACHER: Tomasz Zyska, t.zyska@pollub.pl

COURSE CODE: E029

Fundamentals of metrology

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture/laboratory
NUMBER OF HOURS: 30+30 (lecture + laboratory)	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Basics of Physics, Basics of Electrical Circuits, Basics of Mathematics
CONTENTS: Metrology: its subject, history, and basic terms. Measurement process. Systems of units. Measurement standards. Measurement error and uncertainty. Measurement transducers. Measurement methods. Analog and digital measuring instruments. Oscilloscopes. Measurements of electrical quantities.
EFFECTS OF EDUCATION PROCESS: Knowledge about: basics of metrology, methods of measurement, estimation of measurement accuracy, features of measuring instruments, basic operating of measurement equipment, performing of laboratory measurements
LITERATURE: 1. .
TEACHING METHODS: Lecture, laboratory experiments
ASSESSMENT METHODS: Writing report, oral/written examination
TEACHER: Jacek Majewski, j.majewski@pollub.pl

COURSE CODE: E031

Fundamentals of Optoelectronics

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: lecture, laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Calculus of vector fields in curvilinear coordinates, Partial differential equations, Fundamentals of Electronics.
CONTENTS: **Properties of light**. Light as an electromagnetic wave. Geometrical and wave optics. Total internal reflection. Quantum optics. Propagation of light in anisotropic media. Electrooptic effects. Magnetooptic effects. Polarization of light. States of polarization. Description using the Jones matrix and the Poincare sphere. Retarders. Polarizers. Rotators. **Optical waveguides.** The concept of an optical waveguide. Intuitive model of beam propagation in a waveguide. Waveguide modes. Outline of the Beam Propagation Method. Planar waveguide. Analysis using geometrical optics. Discrete nature of propagation angles. The concept of waveguide modes. Maxwell's equations for a dielectric waveguide. Wave equation of planar waveguide. Definition of a mode. TE and TM modes. Two dimensional waveguides. Cylindrical waveguides. Optical fibers. Single mode fibers. Birefringent single mode fibers. Transmission properties of optical fibers. Attenuation. Dispersion. Nonlinear effects. Microstructred fibers. **Light sources**. Electroluminescent diodes. Gas lasers. Solid-state lasers. Semiconductor lasers. Single mode lasers. Tunable lasers. Semiconductor laser noise. Fiber amplifiers. Fiber amplifier noise. Amplified spontaneous emission sources. Fiber lasers. **Photodetectors**. Photovoltaic detectors. PN junction photodiode. PIN photodiode. Avalanche photodiode. Photodetector preamplifiers. Photodetector noise, sensitivity, signal to noise ratio. **Overview of fiber optic communication systems**.
EFFECTS OF EDUCATION PROCESS: knowledge of the principle of operation, parameters, application and methods of designing the most widely used optoelectronic devices and systems.
LITERATURE
TEACHING METHODS: theory – lecture, programming laboratory
ASSESSMENT METHODS: reports from laboratory experiments, oral exam.
TEACHER: Cezary Kaczmarek, c.kaczmarek@pollub.pl

COURSE CODE: E032

Fundamentals of Physics

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: lecture, laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Basic knowledge of mechanics, electromagnetism and optics at the secondary school level.
CONTENTS: Methods for determining the measurement uncertainty. Mechanics: mass density, uniform motion and uniformly variable motion, harmonic motion – spring and simple pendulum, acoustic waves, mechanical resonance, viscosity of fluids, thermal expansion of bodies. Optics: refractive index, microscopes, lenses - measurements of focal length, diffraction and interference of laser light, polarization of electromagnetic waves, Faraday effect. Electromagnetism: voltage, current, electrical resistance, Ohm's law, Kirchhoff's circuit laws, voltaic cells - electromotive force measurements, series RLC circuits, properties of semiconductors, Hall effect – measuring of magnetic field induction.
EFFECTS OF EDUCATION PROCESS: Students will have ability to set up simple experimental systems, to measure values of basic physical quantities and to estimate measuring uncertainties.
LITERATURE: Jearl Walker, Halliday & Resnick Fundamentals of Physics, John Wiley & Sons Inc. 2011
TEACHING METHODS: theory – lecture, laboratory experiments.
ASSESSMENT METHODS: Oral/written examination
TEACHER: Tomasz Pikula, t.pikula@pollub.pl

COURSE CODE: E033

Human-Computer Interaction

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: lecture and project
NUMBER OF HOURS: 30+30 (lecture + project)	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I or II
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: none.

CONTENTS: Introduction to ergonomics of systems. The theory of action. Cognitive effort and memorability. Models of interactions between human and computer. Types and objects of software interface. The quality of the software interfaces. Usability and accessibility of information systems. Software interfaces designing - general scheme. User-oriented design (UCD). Tools for interface design . Quality assessment of the software interfaces. Methods, techniques and tools

EFFECTS OF EDUCATION PROCESS: After course students will understand problems of interaction between human and computer, have skills in designing systems of interaction between human and computer, using supporting tools. They will have a skills in usability testing interaction between human and computer.

LITERATURE:

1. Dix A., Finlay J. Abowd G., Beale R.: Human-Computer Interaction. Prentice Hall, 2004
2. Sharp H., Rogers Y., Preece J.: Interaction Design. Beyond Human-Computer Interaction. Wiley, 2005
3. Rubin J., Chisnell D., Spool J.: Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests. Wiley, 2008
4. Nielsen J.: Mobile Usability. New Riders, 2012

TEACHING METHODS: theory – lecture, practice – project

ASSESSMENT METHODS: The final coursework assessment consists of: 50% - theoretical test, 50% - project results.

TEACHER: Marek MILOSZ, m.milosz@pollub.pl

COURSE CODE: E060

Internet of things – fundamentals

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30+30 (Lecture + Lab)	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 10

PRELIMINARY REQUIREMENTS:

CONTENTS:
What is the Internet of Things, origins, basic concepts, components, interaction with Man. Network technologies in IoT. Internet of things at home - television, home appliances, intelligent building. Intelligent clothing. Internet of things in vehicles – cars, flying machines. IoT applications in military technology. Urban centre in the IoT. Security and other problems to be solved in IoT.

EFFECTS OF EDUCATION PROCESS:
After the course the participant has knowledge of the concepts and components of the Internet of Things in various areas of human activity.

LITERATURE:

1. http://www.millerwriter.com/book/the-internet-of-things/

TEACHING METHODS: theory – lecture, lab/project

ASSESSMENT METHODS:
Final coursework assessment

TEACHER: Andrzej Smolarz, a.smolarz@pollub.pl

COURSE CODE: E034

Introduction to telecommunications

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: good knowledge of circuits theory, electronics, mathematics (Fourier series and Fourier transform)

CONTENTS:
Basic concepts, telecom messages and signals, description of telecom signals, physical transmission channels, telecom channel analog and digital, modulation analog and digital, demodulation analog and digital, signal and data multiplexing, forward error correction, teletransmission systems, commutation, data networks, mobile systems, principles of digital TV broadcasting. Final coursework assessment.

EFFECTS OF EDUCATION PROCESS:
After the course the participant:

1. Recognizes fundamental concepts in telecommunications, recognizes and describes technical characteristics of telecom systems.
2. Describes modulation and demodulation methods, error protection, multiplexing and commutation, and architectures of telecom systems.
3. Matches telecom services and technical means of communication with typical telecom applications.
4. Can express assessment on the role of telecommunications in industry and society

LITERATURE:

2. Simon Haykin, Communication Systems, 5th ed, John Willey&Sons, 2009

TEACHING METHODS: theory – lecture

ASSESSMENT METHODS:
Midterm and final coursework assessment (100% - test)

TEACHER: Zbigniew Lach, z.lach@pollub.pl

COURSE CODE: E035

IP networks

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture+ laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Knowledge in computer networks
CONTENTS: IPv4 Protocol Addressing. Variable Length Subnet Mask (VLSM) addressing. CIDR (Classless Inter-Domain Routing). Autonomus Systems. Network Address Translation (NAT). IPv6 Network Protocol VLAN. Cisco Discovery Protocol (CDP), IPSec Protocol. IP protocols tunneling. Mobile IP. Static and dynamic routing protocols. RIP, IGRP, EIGRP. OSPF, BGP. Virtual Private Networks
EFFECTS OF EDUCATION PROCESS: Knowledge in structure and protocols of computer IP networks.
LITERATURE: 1.
TEACHING METHODS: lecture, project, laboratory
ASSESSMENT METHODS: Final coursework assessment
TEACHER: Konrad Gromaszek, k.gromaszek@pollub.pl

COURSE CODE: E036

Linux daemon programming

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of C and C++ programming languages and Linux operating system environment (confirmed by finished C programming, C++ programming and Operating System – courses/subject).

CONTENTS:
Presentation of the laboratory curriculum and principles of the coursework assessment. Step by step practical explanation how to create client-daemon programs in C/C++ under Linux: process creation (fork, exec, system, wait), inter process communications (shared memory, semaphores, pipes, FIFOs, message queues), sockets, blocking files, daemon creation.
Final coursework assessment.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with daemon and client programs creation and usage under Linux operation system.
Learning the skills of writing own C/C++ daemon-client software.

LITERATURE:

1. Stevens W. Richard, UNIX Network Programming Volumes 1 and 2, Second edition, Prentice Hall, Inc., 1997.
2. Stones Richard, Matthew Neil, Beginning Linux Programming, 4th Edition, Wrox Press, Ltd 2007

TEACHING METHODS: theory – lecture, practice – laboratory

ASSESSMENT METHODS: Final coursework assessment (20% - activity during classes, 80% - test)

TEACHER: Maciej Pańczyk, *m.panczyk@pollub.pl*

COURSE CODE: E037

Microprocessor technology fundamentals

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: C programming
CONTENTS: Introduction – basic concepts and terms. The standard structure of microprocessor systems. Structure of the microprocessor and microcontroller. Von Neumann and Harvard architecture. Types of processors, data processing rules. Addressing modes, instruction categories, rules of instruction decoding and executing. Architecture of selected microcontrollers. Computer Memory: ROM, RAM features. Hardware and software stack, stack access rules, use of a stack. Interrupts, types of interrupts, interrupt controller, interrupt priorities. Counter – timer circuits (CTC). The structure and programming of timers in selected microcomputer. Serial transmission - principles, serial port structure. Analog converters ADC and DAC, operating principles, typical implementations. DMA - transmission rules, typical structure. Reduction of microcontrollers' power consumption. Electromagnetic compatibility. The reliability of the software. Future development of microprocessors and microcontrollers.
EFFECTS OF EDUCATION PROCESS: The student knows the principles of architecture and logic of microprocessors and microcontrollers. knows peripheral devices and arrangements for their cooperation with the microprocessors and microcontrollers knows the rules of creating algorithms and applications of microprocessor systems in selected programming environments..
LITERATURE:
TEACHING METHODS: lecture, lab/project
ASSESSMENT METHODS: Final coursework assessment
TEACHER: Andrzej Smolarz, *a.smolarz@pollub.pl*

COURSE CODE: E030

Mobile operating systems fundamentals

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: lecture, laboratory
NUMBER OF HOURS: 45 (15lecture, 30laboratory)	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: OS basics, Java / C programming.

CONTENTS:

Lecture – Hardware for mobile platforms. Challenges in mobile computing. Issues in designing mobile computing systems. Mobile operating system. Wireless networks for mobile platforms. Security threats. Android security. How to improve the level of security for Android smartphones. Sensors for mobile platforms. Popularity and comparison of mobile operating systems. Android version history and characteristics. Platform architecture. Android file system. Boot process. Application components. Application development. Application compiling and packaging. Android runtime and Google Play service. Android process management and out-of-memory killer. Android device configurations. Screen density. Defining the size of UI components in layout files. Interface design prinicples. Graphics designing. Providing highly responsive and fast Android applications. Security and permissions.

Laboratory – Android Studio. Introduction into development of Android applications. Anatomy of Android application. The use of virtual and physical devices for testing. Resources organizing and accessing. Application and activity. The livecycle methods. User interface layouts. Event handling. Popular controls. Notifications. Alert dialogs. Intents and data transfer between activities. Fragments. Using dialogs with DialogFragments. App widgets. Drawables. Tween animations. Frame animations. Styles. Themes. Menus and toolbar. Drag and drop gesture. Lists. Sound and media. Converting text into voice. Sending and receiving SMS. Geolocation. Google Maps. Android Sensors. SQLite database. Writing and reading files.

EFFECTS OF EDUCATION PROCESS: General knowledge on mobile systems and practical skills in Android applications development.

LITERATURE

TEACHING METHODS: theory – lecture, practice – laboratory.

ASSESSMENT METHODS: Final coursework assessment (20% - practical test, 40% - theoretical test, 40% - programming project).

TEACHER: Zbigniew Omiotek, PhD (Eng.), z.omiotek@pollub.pl

COURSE CODE: E038

Nuclear Physics and Nuclear Power Engineering

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I (undergraduate)
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basic knowledge of nuclear physics at the secondary school level.
CONTENTS: Structure of atomic nucleus. The binding energy per nucleon. Kinds of radiation. Low of radioactive decay. Interaction of radiation with matter. Nuclear fission – history and conditions of process. Construction and rules of operation of energetic nuclear reactors. Fuel cycle and utilization of nuclear waste. Influence of nuclear power plant on the environment. Future of nuclear power engineering - thermonuclear reactors. Kinds of radiation doses and calculations. Rules of radiological protection.
EFFECTS OF EDUCATION PROCESS: Students will have the extended knowledge on the nuclear processes, nuclear reactors, fuel cycle and the influence of nuclear power plant on the environment. Students will have ability to calculate doses of radiation.
LITERATURE: Introductory Nuclear Physics by Kenneth S. Krane
TEACHING METHODS: multimedia lecture
ASSESSMENT METHODS: test examination
TEACHER: Elżbieta Jartych, *e.jartych@pollub.pl*

COURSE CODE: E039

Numerical methods

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Linear algebra
CONTENTS: Presentation of the laboratory curriculum and principles of the coursework assessment. The course covers: the theory of interpolation and approximation; direct methods for solving systems of linear equations: Gauss, LU and Cholesky factorization; solving an scalar nonlinear equation: Newton, regula falsi and bisection method; numerical integration: Newton-Cotes and Gauss methods; Runge-Kutta methods for ordinary differential equations; the characteristic polynomial and eigenvalues.
EFFECTS OF EDUCATION PROCESS: Acquainting students with basics numerical methods. The knowledge and skills to solve numerical problems using learned methods.
LITERATURE: 1. J. Stoer, R. Bulirsch, Introduction to numerical analysis, Springer, 2002 2. W. Press, S. Teukolsky, W. Vetterling, B. Flannery, Numerical Recipes in C++, Cambridge University Press, 2002
TEACHING METHODS: theory – lecture, practice – laboratory
ASSESSMENT METHODS: Final coursework assessment (100% - final project)
TEACHER: Edyta Łukasik, e.lukasik@pollub.pl

COURSE CODE: E040

Object programming in C++

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of C programming
CONTENTS: Presentation of the laboratory curriculum and principles of the coursework assessment. Material consolidation on C++ programming: variable types, control statements, pointers and references, dynamic memory allocation, function overloading. Object Oriented Programming in C++: classes syntax, fields and methods, constructors and destructors, encapsulation, constant and static members, inheritance. operator overloading, virtual functions, streams. Final coursework assessment.
EFFECTS OF EDUCATION PROCESS: Acquainting students with basics of C++ programming. Learning the skills of using object oriented C++ capabilities.
LITERATURE: 1. Richard L. Halterman, Fundamentals of Programming C++, 2015, http://python.cs.southern.edu/cppbook/progcpp.pdf 2. http://www.cplusplus.com/doc/tutorial/ 3. http://upload.wikimedia.org/wikipedia/commons/e/e9/CPlusPlusProgramming.pdf,
TEACHING METHODS: theory – lecture, practice – laboratory
ASSESSMENT METHODS: Final coursework assessment (exam)
TEACHER: Mariusz Dzieńkowski, m.dzienkowski@pollub.pl

COURSE CODE: E042

Parallel and distributed programming

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of C and C++ programming languages and Linux operating system environment (confirmed by finished C programming, C++ programming and Operating System – courses/subject)..

CONTENTS:
Presentation of the laboratory curriculum and principles of the coursework assessment.
Introductory course for C++ multithread programming (using boost library or C++ v.11 threads) and two main standards of parallel and distributed programming: OpenMP and MPI.Basics of parallel computing (calculation efficiency, Amdahl's law for parallel computing). Shared memory multiprocessing programming in C/C++ using boost library (mutexes, conditional variables, monitors and semaphores) and OpenMP (#pragma statements, parallel construction, parallel for loop, constructions - sections, barrier, critical, atomic, flush, reduction operations). Message Passing Interface (MPI) standard basics (communicators, groups of processes, MPI functions, point–to-point communication, collective communication, virtual topologies, derived datatypes, data packing). Final coursework assessment.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with C++ multithread programming including boost library and two main standards of parallel and distributed programming: OpenMP and MPI. Learning how to speedup a program using multiple processors or hosts with OpenMP and MPI programming skills.

LITERATURE:

1. Boost Library Documentation - Concurrent Programming http://www.boost.org/doc/libs/?view=category_Concurrent
2. The OpenMP API specification for parallel programming, http://openmp.org/wp/
3. A users' guide to MPI, ftp://math.usfca.edu/pub/MPI/mpi.guide.ps

TEACHING METHODS: theory – lecture, practice - laboratory

ASSESSMENT METHODS: Final coursework assessment (20% - activity during classestest, 80% - test)

TEACHER: Maciej Pańczyk, m.panczyk@pollub.pl

COURSE CODE: E043

PLC Controllers

FACULTY: ELECTRICAL ENGINEERING AND COMPUTER SCIENCE	CLASS TYPE: Lecture/Laboratory
NUMBER OF HOURS: 30+30 (lecture + laboratory)	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Bool algebra
CONTENTS: **PLC concept and components**, **PLC configuration** – I/O modules, **PLC data and addressing**, **PLC programming –** text and graphical methods, **PLC logic functions** – bit, shift and rotate functions, **PLC timer and counter functions**, **PLC math functions**, **Sequential Function Chart**, **PLC interrupts, PID alghotitms**
EFFECTS OF EDUCATION PROCESS: Students will gain knowledge about structure and functionality of PLC Controllers. Students will have ability to design and analyse of PLC control systems used in industry.
LITERATURE: 1. William Bolton, Programmable Logic Controllers, Newnes, 2015.
TEACHING METHODS: Lecture + laboratory exercises
ASSESSMENT METHODS: Oral/written examination
TEACHER: Adam Kurnicki, a.kurnicki@pollub.pl

COURSE CODE: E044

Power electronics

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture+laboratory
NUMBER OF HOURS: 60 (30 lecture, 30 practise)	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Knowledge in electrical circuits, Knowledge in fundamentals of electronics
CONTENTS: Power electronic components (diodes, BJT, power MOSFET, IGBT, thyristors, GTO); Power rectifiers, AC/DC, DC/DC-up and down conversion, Inverters, AC/AC converters Safety and EMC
EFFECTS OF EDUCATION PROCESS: Knowledge in industrial and power applications of electronics.
LITERATURE:
TEACHING METHODS: lecture, Laboratory, project
ASSESSMENT METHODS: Final coursework assessment
TEACHER: Tomasz Zyska, t.zyska@pollub.pl

COURSE CODE: E045

Power generation

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture, laboratory
NUMBER OF HOURS: 15+15 (lecture + computer laboratory)	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: None
CONTENTS: Fundamentals of power generation, Fundamentals of thermodynamics in power generation, Enthalpy, Entropy, Steam parameters, Thermal plants, Steam Cycle/Rankine Cycle, Types and Operation of steam turbines, Operation of boilers, drums, reheaters, superheaters, condensers and pumps in Rankine Cycle, Efficiency of power plants, Fuel consumption of power plants, Modelling fundamentals of steam cycles, Gas turbines, CCHP plants.
EFFECTS OF EDUCATION PROCESS: Students will gain knowledge about processes of energy conversions in power generation in thermal plants. Will have ability to analyse thermal processes which occur in power plants, will have ability to model and simulate operation of steam cycles at the basic level
LITERATURE: 1. .
TEACHING METHODS: Lecture, Laboratory project
ASSESSMENT METHODS: written report about the project, oral/written examination
TEACHER: Michał Wydra, m.wydra@pollub.pl

COURSE CODE: E046

Power System Analysis

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture, laboratory
NUMBER OF HOURS: 15+15 (lecture + computer laboratory	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Power Generation, Electrical Circuits
CONTENTS: Power Systems, Energy Distribution, Electric Grids, Electric Lines, Transformers, Load Flow Analysis
EFFECTS OF EDUCATION PROCESS: Knowledge about structure of Power Systems, Power Transmission and Distribution, modelling of lines, transformers, generators and load for load flow analysis, load flow analysis,
LITERATURE: 1. .
TEACHING METHODS: Lecture, Computer Simulation
ASSESSMENT METHODS: Writing report, oral/written examination
TEACHER: Sylwester Adamek, s.adamek@pollub.pl

COURSE CODE: E048

Probability and statistics

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and discussion
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 7

PRELIMINARY REQUIREMENTS: Good knowledge of Calculus and Set Theory
CONTENTS: Sample spaces and events. Definitions of probability. Axioms and theorems. Conditional probability. Independence. Discrete and continuous single random variables. Probability mass function. Probability density function. Expectation, variance and other moments. Families of discrete distributions. Families of continuous distributions. Discrete and continuous multiple random variables. Joint probability distributions. Sequences of Random variables. Central limit theorem. Population and sample, parameters and statistics. Simple descriptive statistics. Graphical statistics. Parameter estimation. Confidence intervals. Hypothesis testing.
EFFECTS OF EDUCATION PROCESS: This course is designed to introduce students to various topics in probability and uncertainty that they will encounter in engineering. Exercises are designed to encourage the student to begin thinking about probability and uncertainty within engineering and computer science problems.
LITERATURE: 1. S. M. Ross, Introduction to probability and statistics for engineers and scientists, Elsevier Academic Press, 2004 2. R. Durret, Elementary probability for applications, Cambridge University Press, 2009
TEACHING METHODS: lecture, class discussion
ASSESSMENT METHODS: weekly homework assignments, a final exam.
TEACHER: Małgorzata Murat m.murat@pollub.pl

COURSE CODE: E049

Preparation of Scientific Publications

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and project
NUMBER OF HOURS: 30+30 (lecture + project)	ECTS: 5
SEMESTER: winterorsummer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: none
CONTENTS: Scientific achievements – assessment. Quality of publications. Evaluation lists (Polish and foreign). Bibliometrics. Bibliographic databases (WoS, Scopus, Google Scholar, dblp,). Science and professional social services: Research Gate, LinkedIn, etc. Scientific databases of abstract and full text (digital library): ScienceDirect, ACM, IEEE Xplore, Emerald). Citation concepts and styles. Referencing. Language and formatting of scientific publications. Publication procedures. Structure of publications: Title, Abstract, Introduction, Thesis/ hypothesis, Material and Research Methodology/Methods, Results, Discussion.
EFFECTS OF EDUCATION PROCESS: After course students will be: familiar with all aspects of preparation of scientific publications. They will understand the high quality of publication preparation and procedures.
LITERATURE: 1. Blackwell J., Martin J.: A Scentific Approach to Scentific Writing. Springer, 2011 2. James E. A., Slater T.: A map for writing your dissertation: Proven methods for finishing faster. Thousand Oaks, CA, USA. Sage Publications, 2013 3. Kothari C.R., Garg Gaurav: Research Methodology: Methods and Techniques. New Age International, 3rd edition, 2014
TEACHING METHODS: theory – lecture, practice – project for own preparation a publication
ASSESSMENT METHODS: The final coursework assessment consists of: 50% - theoretical test, 50% - project results
TEACHER: Marek MILOSZ, m.milosz@pollub.pl

COURSE CODE: E050

Programming in JAVA

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	

PRELIMINARY REQUIREMENTS: Good knowledge of the basics of programming
CONTENTS: Presentation of the laboratory curriculum and principles of the coursework assessment. Classes as the fundamental building blocks of a Java program. Structure of the Java application. Variable declarations, displaying the data, control statements. Class syntax: fields and methods, constructors, constant and static members. Encapsulation. Exception handling. Inheritance: super class and subclass. Defining and implementing the interfaces. Graphical user interface. Event listeners. Streams. Final coursework assessment.
EFFECTS OF EDUCATION PROCESS: Ability to create a simple java application. Ability to create a java application with graphical user interface.
LITERATURE: 3. Patrick Niemeyer and Daniel Leuck, Learning Java, 4th Edition, O'Reilly Media's 2013, http://chimera.labs.oreilly.com/books/1234000001805/index.html 4. http://docs.oracle.com/javase/tutorial/
TEACHING METHODS: theory – lecture, practice - laboratory
ASSESSMENT METHODS: Final coursework assessment (exam)
TEACHER: Beata Pańczyk, b.panczyk@pollub.pl

COURSE CODE: E061

Python Programming

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture/laboratory
NUMBER OF HOURS: 15+15 (lecture + laboratory)	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I and II
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: basic skills of programming

CONTENTS:
Python programming fundamentals: variable and data types, control structures, strings, collections (lists, tuples and dictionaries), functions, modules, input/output, exception handling.
Advanced Python: object oriented programming concept, regular expressions, CGI, database interaction, GUI programming, data and information processing techniques, data visualisation.

EFFECTS OF EDUCATION PROCESS:
Developing proficiency in creating applications using the Python Programming Language.
Understanding various data structures available in the Python programming language and applying them for solving problems from different fields of science.

LITERATURE:

1. Allen Downey, Think Python. How to Think Like a Computer Scientist, http://interactivepython.org/courselib/static/thinkcspy/index.html
2. The Python Tutorial, https://docs.python.org/3/tutorial/index.html
3. Cody Jackson, Learning to Program Using Python, https://docs.google.com/file/d/0B8IUCMSuNpl7MnpaQ3hhN2R0Z1k/edit
4. Brad Miller and David Ranum, Problem Solving with Algorithms and Data Structures using Python, http://interactivepython.org/runestone/static/pythonds/index.html

TEACHING METHODS: theory - lecture, practice - laboratory

ASSESSMENT METHODS: Final coursework assessment (exam)

TEACHER: Dr. Mariusz Dzieńkowski, m.dzienkowski@pollub.pl

LIST OF COURSES

COURSE CODE: E051

Software engineering

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: basic knowledge of software applications designing

CONTENTS:
Presentation of the laboratory curriculum and principles of the coursework assessment.
Material consolidation on software engineering: gathering and analyzing of system requirements, Entity Relationship Diagram (ERD), Business Process Modeling Notation (BPMN), UML models, Design Patterns, Model Driven Engineering basics.
Final coursework assessment.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with standards and methods of software designing.
Learning the skills of applications design in practice.

LITERATURE:

1. Ian Sommerville. Software Engineering, 2010.
2. Norman Daoust. UML Requirements Modeling For Business Analysts. 2012.
3. Alan Dennis, Barbara Haley Wixom, David Tegarden: Systems Analysis and Design with UML.

TEACHING METHODS: theory – lecture, practice - laboratory

ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - final project)

TEACHER:. Malgorzata Plechawska-Wójcik, m.plechawska@pollub.pl

COURSE CODE: E052

Software final project

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: knowledge of software engineering, skills of object programming
CONTENTS: Presentation of the laboratory curriculum and principles of the coursework assessment. Material consolidation on the final project: analyzing of system requirements, UML diagrams, ERD diagram, graphical user interface project, team work supporting tools, basics of software project management, software development. Final coursework assessment.
EFFECTS OF EDUCATION PROCESS: Acquainting students with process of the software project development. Learning the skills of team work.
LITERATURE: 1. Alan Dennis, Barbara Haley Wixom, David Tegarden: Systems Analysis and Design with UML.
TEACHING METHODS: practice - laboratory
ASSESSMENT METHODS: Final coursework assessment (100% - final project)
TEACHER: Malgorzata Plechawska-Wójcik, m.plechawska@pollub.pl

COURSE CODE: E053

Software project management

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I or II
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: no

CONTENTS:
Project - definition, essence, problems, organization. PM methodology. Types of methodology. PMI and Prince2. Planning in project life cycle. Type of plans. Typical structure of planning activities. Techniques: WBS, milestones, net diagrams, cost planning. Project tracking and controlling.
Practical project planning: MS Project - tool for planning and tracking. Building the WBS and time planning. Analyze of schedule. Resource definition and allocation. Problems in allocation and its resolve. Project plan reporting.
Agile Software Project Management. Agile Manifesto. XP principles, techniques and project life cycle. SCRUM methodology.

EFFECTS OF EDUCATION PROCESS:
After course students will be: familiar with all aspects of project management (classical and agile methods), ready to work as a team member, able to use project planning and monitoring software tools and methods.

LITERATURE:
1. Meredith J.R., Mantel S. J.: Project Management. A Managerial Approach. John Wiley & Sons, NY, 2009
2. Cohn M.: Succeeding with Agile: Software Development Using Scrum, Addison-Wesley Professional, 2009

TEACHING METHODS: theory – lecture, practice – laboratory and project

ASSESSMENT METHODS: The final coursework assessment consists of: 30% - theoretical test, 30% - laboratories, 40% - final project assessment

TEACHER: Marek MILOSZ, m.milosz@pollub.pl

COURSE CODE: E054

Stochastic processes in engineering systems

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: II (graduate)
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: calculus, probability theory
CONTENTS: Introduction to Stochastic Processes. Poisson Process, Wiener and White noise Processes. Stationary and Nonstationary Processes. Stochastic Calculus. Correlation, power spectrum, spectral density. Linear System Analysis. Differential Equations with Random Forcing Functions. Spectral Method for Stationary Systems. Nonstationary Response Analysis.
EFFECTS OF EDUCATION PROCESS: This course provides a foundation in the theory and applications of stochastic processes and an understanding of the mathematical techniques relating to random processes in the areas of signal processing, detection, estimation, and communication.
LITERATURE: 1. J. A. Gubner: Probability and random processes for electrical and computer engineers , Cambridge University Press 2006 2. B. Hajek E. Wong: Stochastic processes in engineering systems, Springer Texts in Electrical Engineering
TEACHING METHODS: lecture
ASSESSMENT METHODS: mid-term exams, home-work, final exam.
TEACHER: Zbigniew Łagodowski, z.lagodowski@pollub.pl

COURSE CODE: E055

Sustainability and Environment

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: basics of biology, chemistry and physics
CONTENTS: Fundamentals of ecology, basic definitions, sustainability. Biological communities and relations between organisms. Population, biodiversity. Ecological succession, flow of energy through an ecosystem. Cycles of nutrients. Earth’s atmosphere, gas laws. Indoor air pollution. Outdoor air pollution. Photogenic smog, acid rain. Ozone depletion, global warming. Measurement of pollutants’ concentrations. Chosen examples of pollution control technologies.
EFFECTS OF EDUCATION PROCESS: Students will gain basic knowledge in a multidisciplinary academic field that integrates physical, chemical and biological sciences applied for study of environmental problems.
LITERATURE: 1. . D. Chiras “Environmental Science”, M. McKinney, R. Schoch, L. Yonavjak “Environmental Science: Systems and Solutions”
TEACHING METHODS: Lecture
ASSESSMENT METHODS: Activity in the class, oral presentation, panel presentation, report and attendance.
TEACHER: Joanna Pawłat, j.pawlat@pollub.pl

COURSE CODE: E056

System dynamics

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I or II

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: none
CONTENTS: Systems Analysis and Thinking. The idea and aims of systems modelling. Areas and advantages (dis-) of computer simulations. System Dynamic Modelling. Stages of systems modelling: purpose definition, conceptualisation, model formulation and computerisation, testing and implementation. Boundary and key variables definition. Behaviour description. Casual-Loop Diagrams. Model formulation. Stock-Flow Models. Stock as an integrator and flow as an changer of stock. System Dynamics notation. Parameters and functions of flow controller. Behaviour modelling. Multi-flows models. Interrelations. Modelling software and “Services Market Development” Serious Game – practical trainings.
EFFECTS OF EDUCATION PROCESS: After course students will be familiar with idea and methods of System Dynamic. Students will have practical skills in SD approach and software.
LITERATURE: 1. Sterman J.D. Business Dynamics: Systems Thinking and Modeling for a Complex World. McGraw-Hill, 2000.
TEACHING METHODS: theory – lecture, practice – laboratory and the game
ASSESSMENT METHODS: The final coursework assessment consists of: 40% - theoretical test, 40% - laboratories, 20% - game results
TEACHER: Marek MILOSZ, m.milosz@pollub.pl

COURSE CODE: E057

User experience

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: knowledge of web programming

CONTENTS:
Presentation of the laboratory curriculum and principles of the coursework assessment.
Material consolidation on user experience: definitions and standards, characteristics of GUI (Graphical User Interface) for web applications, common errors, GUI design methods and techniques, testing and analysis of GUI usability, accessibility.
Final coursework assessment.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with GUI standards and methods of GUI testing and analysing.
Learning the skills of GUI designing.

LITERATURE:

1. Designing Web Usability: The Practice of Simplicity, J. Nielsen.
2. Don't Make Me Think: A Common Sense Approach to Web Usability, S. Krug.
3. Homepage Usability: 50 websites deconstructed, J. Nielsen, M. Tahir.
4. Jakob Nielsen web page - http://www.useit.com/

TEACHING METHODS: theory – lecture, practice - laboratory

ASSESSMENT METHODS: Final coursework assessment (50% - test, 50% - final project)

TEACHER: mgr Magdalena Borys (email: m.borys@pollub.pl)

COURSE CODE: E058

Web application development

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	MINIMAL NUMBER OF STUDENTS: 5

PRELIMINARY REQUIREMENTS: Good knowledge of the basics of programming

CONTENTS:
Presentation of the laboratory curriculum and principles of the coursework assessment.
Web application architecture. Basic standards in the creation of web applications: HTML5 mark-up language, CSS style sheet rules. The concept of accessibility and flexibility of web pages. Responsive web design. Document Object Model. Interaction elements on web pages – CSS3, JavaScript, jQuery.
Final coursework assessment.

EFFECTS OF EDUCATION PROCESS:
Acquainting students with basic tools for web application development.
Ability to create a simple web application.

LITERATURE:

1. http://www.w3schools.com/

TEACHING METHODS: theory – lecture, practice - laboratory

ASSESSMENT METHODS: Final project assessment

TEACHER: Marcin Badurowicz, M.Sc., m.badurowicz@pollub.pl

LIST OF COURSES

COURSE CODE: E059

Web programming in PHP

FACULTY: Electrical Engineering and Computer Science	CLASS TYPE: lecture and laboratory
NUMBER OF HOURS: 30	ECTS: 5
SEMESTER: winter or summer	CLASS LEVEL: I
LANGUAGE OF INSTRUCTION: English	

PRELIMINARY REQUIREMENTS: Knowledge of creating Web applications in HTML and CSS, basic knowledge of databases

CONTENTS:
Building Web pages,
Creating Web applications,
MySQL database integration in Web applications,
Implementing social tools in Web pages

EFFECTS OF EDUCATION PROCESS:
Competence to develop usable and accessible web applications with PHP and MySQL

LITERATURE:

1. K. Tatroe, P. Maclntyre, R. Lerdorf, Programming PHP, O'Reily 2013
2. L. Welling, L. Thompson, PHP and MySQL Web Development (5th Edition), Addison-Wesley Professional, 2013

TEACHING METHODS: theory – lecture, practice - laboratory

ASSESSMENT METHODS: Final coursework assessment (40% - test, 60% - final project)

TEACHER: Tomasz Szymczyk, M.Sc., Eng. t.szymczyk@pollub.pl

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LIST OF COURSES