



Advanced Soil Science – FEE01

FACULTY: Environmental Engineering	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 3
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basic soil science
CONTENTS: International soil classification, soil chemistry, soil physics, soil physical chemistry, soil oxygenology, anthropogenic soils, soil degradation, migration and fate of pollutants in soil.
EFFECTS OF EDUCATION PROCESS: knowledge of soil terminology, basic knowledge of international soil classification, knowledge of soil chemistry, soil physics, soil physical chemistry, soil oxygenology, anthropogenic soils, soil degradation, migration and fate of pollutants in soil
LITERATURE (OPTIONAL): Geotechnical Engineering: Soil and Foundation Principles and Practice by: R. L. Handy
TEACHING METHODS: multimedia lecture
ASSESSMENT METHODS: written test of knowledge
TEACHER (NAME, EMAIL CONTACT): Prof. Ph.D., D.Sc. Witold Stępniewski, w.stępniewski@wis.pol.lublin.pl



Sustainable Development Course – FEE02

FACULTY: Environmental Engineering	CLASS TYPE: lecture
NUMBER OF HOURS: 30	ECTS: 3
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basic knowledge from the field of protection of the environment.
CONTENTS: Background of sustainable development; Energy and climate; Resources; Urbanization; Production and consumption; life, food and fibres; Mobility; Welfare and lifestyle; Politics; Economics; Education. The lecture is a part of The Baltic University programme.
EFFECTS OF EDUCATION PROCESS: Studying sustainable development is a way to come to grips with questions concerning present and future situation of human societies. The course provides knowledge of basic issues connected with three pillars of sustainable development (ecological, economic and social). Important part is also learning of evaluation abilities concerning sustainable development issues.
LITERATURE (OPTIONAL): L. Ryden, P. Migula, N. Andersson (ed.), <i>Environmental Science</i> , Uppsala Publishing House, Uppsala 2003. Materials from the official website of the Baltic University: http://www.balticuniv.uu.se/index.php/introduction/home
TEACHING METHODS: lectures
ASSESSMENT METHODS: examination
TEACHER (NAME, EMAIL CONTACT): Assoc. Prof. Ph.D., D.Sc. Artur Pawłowski, a.pawlowski@wis.pol.lublin.pl



Computer Science II (programming) – FEE03

FACULTY: Environmental Engineering	CLASS TYPE: lecture+lab
NUMBER OF HOURS: 15+30	ECTS: 7
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: basic computer science course
CONTENTS: programming in C, main structure of a code, loops, arithmetic and logical operators, functions, variables, and prototypes, strings and arrays, pointers, input/output, character manipulation.
EFFECTS OF EDUCATION PROCESS: ability to program and execute a simple programs in C language, understanding of program syntax and main elements of language
LITERATURE (OPTIONAL): internet sources, manuals for C language, examples of code
TEACHING METHODS: lecture for theoretical information, laboratory for practical applications of gained knowledge
ASSESSMENT METHODS: 2 written tests, 2 demonstration programs written by each student, assessment of progress during laboratory exercises
TEACHER (NAME, EMAIL CONTACT): Prof. Ph.D., D.Sc. Henryk Sobczuk, h.sobczuk@wis.pol.lublin.pl

**Waste Management – FEE04**

FACULTY: Environmental Engineering	CLASS TYPE: lecture+seminar
NUMBER OF HOURS: 30+15	ECTS: 5
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS:
CONTENTS: Basic definitions, waste classification. Waste management strategies and waste utilization methods. No waste and low waste technologies. Waste minimization, material recycling, energy recovery. Waste deposition on landfills – localization, construction, management and reclamation of landfill. Thermal, chemical and biological methods of waste utilization. Thermal methods: incineration, pyrolysis, incineration in cement kilns. Biological methods: composting and methane digestions – basics of processes, installations. Chemical methods – selected processes for selected industrial wastes, no-waste technologies. Management of selected categories of wastes. Industrial and municipal wastes. Nuclear wastes.
EFFECTS OF EDUCATION PROCESS: Basic knowledge about waste management and effects of waste management strategies and utilization methods on the environment. Basic knowledge about thermal, chemical and biological methods of waste utilization. Knowledge about byproducts of various waste management methods and their influence on the environment. Detailed knowledge about the management of selected categories of wastes. The ability to assess waste management methods from the point of the influence on the environment, on the basis of the critical analysis of literature and available information. The awareness about extra-technical aspects and results of localization and building waste landfills and other installations for waste utilization.
LITERATURE (OPTIONAL): handouts plus recommended articles
TEACHING METHODS: lecture, individual work with students preparing their presentations
ASSESSMENT METHODS: lecture – two tests (midterm and final), seminar – students' presentation (oral supported by Power Point)
TEACHER (NAME, EMAIL CONTACT): Assoc. Prof. Ph.D., D.Sc. Marzenna R. Dudzińska, m.dudzinska@wis.pol.lublin.pl



Seminar on Advanced Methods for Water Purification/
Technological Water and Wastewater Utilization – FEE05

FACULTY: Environmental Engineering	CLASS TYPE: seminar
NUMBER OF HOURS: 30	ECTS: 3
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: english
PRELIMINARY REQUIREMENTS: Basic knowledge of water treatment processes
CONTENTS: Water pollutants; ion exchange - principles, terminology, classification of ion exchangers and resins, equilibrium and kinetics, technologies, water deionisation, water softening, fibrous ion exchangers; Ion exchange membranes, liquid membranes, electro dialysis, micro-, ultra- and nanofiltration, reverse osmosis.
EFFECTS OF EDUCATION PROCESS: Knowledge of advanced methods used in water softening and treatment: ion exchange, electro dialysis, ultra- and nanofiltration, liquid membranes, reverse osmosis.
LITERATURE (OPTIONAL): Water Quality & Treatment: A Handbook on Drinking Water by: American Water Works Association, James Edzwald
TEACHING METHODS: multimedia lecture, spoken interactions, individual work with students.
ASSESSMENT METHODS: Written reports prepared by students.
TEACHER (NAME, EMAIL CONTACT): Prof. Ph.D., D.Sc. Lucjan Pawłowski, l.pawlowski@pollub.pl



Seminar on Land Use and Conservation – FEE06

FACULTY: Environmental Engineering	CLASS TYPE: seminar
NUMBER OF HOURS: 30	ECTS: 3
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basic soil science
CONTENTS: Soil degradation (physical, chemical and biological), soil protection against erosion and other forms of degradation, soil reclamation, environmental oxygenology, landfill lining and capping, landfill recultivation, recultivation of open cast mines.
EFFECTS OF EDUCATION PROCESS: : basic knowledge of soil degradation forms (physical, chemical and biological), measures of soil protection against erosion and other forms of degradation, soil reclamation, environmental oxygenology, landfill lining and capping, landfill recultivation and aftercare, recultivation of open cast mines.
LITERATURE (OPTIONAL): Land Development Handbook: Planning, Engineering, and Surveying by: Sidney O. Dewberry
TEACHING METHODS: lectures, student's individual work and preparation of multimedia presentations
ASSESSMENT METHODS: evaluation of presentations
TEACHER (NAME, EMAIL CONTACT): Prof. Ph.D., D.Sc. Witold Stępniewski, w.stępniewski@wis.pol.lublin.pl



Characteristic of water supply and sewage treatments systems – FEE07

FACULTY: Environmental Engineering	CLASS TYPE: lecture+field classes
NUMBER OF HOURS: 15+30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: english
PRELIMINARY REQUIREMENTS: Basic knowledge of chemistry and biology.
CONTENTS: Water cycle and resources of water. Water intake stations, pumping stations, water treatment stations, filters, water distribution systems and their control, sewage networks, sewage treatment plants, mechanical sewage treatment, biological sewage treatment, advanced nutrient removal, sludge management, sludge dewatering and drying.
EFFECTS OF EDUCATION PROCESS: General knowledge of functioning of water supply systems and sewage systems. Ability to recognize basic devices used in treatment processes and their functions.
LITERATURE (OPTIONAL): Handbook of Environmental Engineering Calculations by Ronald A.Walsh
TEACHING METHODS: multimedia lecture and field classes – several trips to water intake stations and wastewater treatment plant
ASSESSMENT METHODS: test of knowledge and students' written reports
TEACHER (NAME, EMAIL CONTACT): M.Eng. Agnieszka Żelazna, a.zelazna@wis.pol.lublin.pl



Environmental Law – FEE08

FACULTY: Environmental Engineering	CLASS TYPE: lecture+seminar
NUMBER OF HOURS: 15+15	ECTS: 3
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: english
PRELIMINARY REQUIREMENTS: -
CONTENTS: Case study class led by USA specialist of environmental law and energy law. Elements of environmental law and energy law based on practical examples.
EFFECTS OF EDUCATION PROCESS: Basic knowledge about the regulations concerning environmental and energy issues.
LITERATURE (OPTIONAL): -
TEACHING METHODS: multimedia lecture, individual work with students on their reports
ASSESSMENT METHODS: written reports.
TEACHER (NAME, EMAIL CONTACT): visiting professor from USA



Computer Aided Designing – 2D vector graphics – FEE09

FACULTY: Environmental Engineering	CLASS TYPE: lecture+lab
NUMBER OF HOURS: 15+30	ECTS: 5
SEMESTER: winter	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basic knowledge connected with 2D geometry, coordinate geometry, technical drawing and graphic documentation of engineering object.
CONTENTS: Computer Aided Designing, two dimensional vector graphics, technical drawing, drawing of environmental engineering devices by CAD tools, AutoCad, Autodesk Building System.
EFFECTS OF EDUCATION PROCESS: Knowledge about the basic and advanced functions of AutoCAD settings and options, ability of drawing of 2D engineering projects.
LITERATURE (OPTIONAL):
TEACHING METHODS: Lecture – multimedia presentations, examples of using following options for preparing technical documentation with vector graphics, laboratory – exercises with AutoCAD program using proper tools and settings for preparing technical documentation.
ASSESSMENT METHODS: Two tests of knowledge and abilities, first connected with basic settings, drawing and description of object, second with advanced settings, edition and preparation of engineering graphical documentation for printing.
TEACHER (NAME, EMAIL CONTACT): Ph.D. Eng. Grzegorz Łagód, g.lagod@wis.pol.lublin.pl, Ph.D. Eng. Zbigniew Suchorab, z.suchorab@wis.pol.lublin.pl



Environmental Biology – FEE10

FACULTY: Environmental Engineering	CLASS TYPE: lecture+lab
NUMBER OF HOURS: 15+15	ECTS: 5
SEMESTER: summer	CLASS LEVEL: undergraduate/ master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: general knowledge about biology
CONTENTS: Biology, ecology, ecosystem, sustainability of ecosystems, biodiversity, microbial ecology, ecological biochemistry, soil microbiology, environmental factors influencing on population
EFFECTS OF EDUCATION PROCESS: comprehension of interspecies interactions in an environment and interactions between living organism and its environment, ability to identify indicator organisms and a source of pollution, ability to characterize a structure of community by biodiversity indexes
LITERATURE (OPTIONAL):
TEACHING METHODS: multimedia presentation, lecture, discussion, demonstrations
ASSESSMENT METHODS: test of knowledge, paper
TEACHER (NAME, EMAIL CONTACT): Ph.D. Agnieszka Rozej, a.rozej@wis.pol.lublin.pl



Computer Aided Designing – 3D vector graphics – FEE11

FACULTY: Environmental Engineering	CLASS TYPE: lecture+lab
NUMBER OF HOURS: 15+30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: english
PRELIMINARY REQUIREMENTS: Basic knowledge on AutoCAD operating. Ability to work in 2D environment. Ability to use Cartesian and polar coordinates. Ability to draw and modify two-dimensional objects.
CONTENTS: Computer Aided Designing. Introduction to 3D Modeling environment of AutoCAD. Spherical and Cylindrical coordinates. User Coordinate System. Types of three-dimensional objects (wireframes, faces, solids). Solid primitives. Advanced solids. Edition of the 3D objects. Visual styles. Basics of Rendering. Drawing 3D models of the engineering objects.
EFFECTS OF EDUCATION PROCESS: Ability to use Spherical and Cylindrical coordinates. Ability to use User Coordinate Systems. Ability to draw particular types of 3D objects. Ability to draw and visualize 3D models of engineering objects.
LITERATURE (OPTIONAL):
TEACHING METHODS: Visual presentation of working in AutoCAD 3D on projector. Working with students on their computers.
ASSESSMENT METHODS: Drawing an advanced model of engineering object. Showing the results in the form of vector graphics and in the form of the rendered rasters.
TEACHER (NAME, EMAIL CONTACT): Ph.D. Eng. Zbigniew Suchorab, z.suchorab@wis.pol.lublin.pl, Ph.D. Eng. Grzegorz Łagód, g.lagod@wis.pol.lublin.pl



Computer Aided Designing – mathematical support of designing, MathCAD – FEE12

FACULTY: Environmental Engineering	CLASS TYPE: lecture+lab
NUMBER OF HOURS: 15+30	ECTS: 5
SEMESTER: summer	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basics of mathematics
CONTENTS: Computer Aided Designing, mathematical support of designing, designing environmental engineering devices by CAD tools (MathCAD), verification, validation, documentation and re-use of engineering calculations, utilize numerous numeric functions, across examples such as statistics, data analysis, image processing, and signal processing. Automatic management of units throughout the worksheet, operations of unit-reduction. Systems of equations solved through the use of several methods. Calculation of expressions symbolically, including systems of equations.
EFFECTS OF EDUCATION PROCESS: Ability to use Computer Aided Designing tools in engineering calculations
LITERATURE (OPTIONAL): Manuals for MathCAD
TEACHING METHODS: Multimedia lecture, students' own work with projects
ASSESSMENT METHODS: Test of knowledge
TEACHER (NAME, EMAIL CONTACT): Ph.D. Eng. Marcin Widomski, m.widomski@wis.pol.lublin.pl, M.Eng. Justyna Stefaniak, j.stefaniak@wis.pol.lublin.pl



Ventilation and Air Conditioning – FEE13

FACULTY: Environmental Engineering	CLASS TYPE: lecture+exc.
NUMBER OF HOURS: 15+15	ECTS: 5
SEMESTER: summer	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basics of environmental engineering
CONTENTS: Thermal comfort in buildings. Internal and external air parameters calculations. Heat gains and losses. The quality of indoor air. The aerodynamics of air flows in rooms. Natural ventilation. Mechanical ventilation. Hybrid systems. Hydraulics in ventilation. Molier's graph and air parameters. Elements of ventilation systems.
EFFECTS OF EDUCATION PROCESS: Knowledge of systems and devices used in ventilation. Ability to calculate the basic air parameters. Basic knowledge of mechanical systems designing.
LITERATURE (OPTIONAL): Building Design and Construction Handbook by: Frederick S. Merritt, Jonathan T. Ricketts
TEACHING METHODS: multimedia lecture, practical examples
ASSESSMENT METHODS: test of knowledge
TEACHER (NAME, EMAIL CONTACT): M.Eng. Agnieszka Żelazna, a.zelazna@pollub.pl, Ph.D. Eng. Mariusz Skwarczyński, m.skwarczynski@wis.pol.lublin.pl



Fundamentals of Hydraulics – FEE14

FACULTY: Environmental Engineering	CLASS TYPE: lecture+exc.
NUMBER OF HOURS: 15+15	ECTS: 5
SEMESTER: summer	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: knowledge of mathematic (standard algebra, differential equations, integrations) and physics (force, surface force, torque, Newtonian kinematics).
CONTENTS: Hydraulics, liquids and its properties, pressure, hydrostatic pressure, pressurized liquid, continuity of flow, Bernoulli theorem, Reynolds number, flow resistance, pipe flow, open channel flow, flow in porous media.
EFFECTS OF EDUCATION PROCESS: Student has knowledge about fundamentals of liquid behavior in steady conditions (absolute and relative equilibrium) under influence of outside surface and volume forces, knows and understands the hydrostatic pressure and its units, pressure of force and buoyancy force. Student knows the basic description of mass and energy conservation for fluid in steady flow – equation of continuity and the Bernoulli's equation as well as knows the Chezy's formula for mean velocity of flow in open channel. Student can calculate the friction factor, friction (linear) and minor pressure losses for pressure pipe flow and hydraulic slope/drop. Student knows the Darcy's law describing uniform fluid flow through the porous media.
LITERATURE (OPTIONAL):
TEACHING METHODS: Lecture (multimedia presentation), exemplary problems, group problems solving (exercises)
ASSESSMENT METHODS: Test – combination of questions considering theory of hydraulics and solutions of selected problems.
TEACHER (NAME, EMAIL CONTACT): Ph.D. Eng. Marcin Widomski, m.widomski@wis.pol.lublin.pl



Environmental Aspects of Nuclear Power Engineering – FEE15

FACULTY: Environmental Engineering	CLASS TYPE: lecture
NUMBER OF HOURS: 15	ECTS: 3
SEMESTER: summer	CLASS LEVEL: undergraduate

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. Law 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 (OPTIONAL): Introductory Nuclear Physics by Kenneth S. Krane
TEACHING METHODS: multimedial lecture
ASSESSMENT METHODS: test examination
TEACHER (NAME, EMAIL CONTACT): Assoc. Prof. Ph.D., D.Sc. Elżbieta Jartych, e.jartych@pollub.pl



Basics of environmental chemical analysis – FEE16

FACULTY: Environmental Engineering	CLASS TYPE: lecture+seminar
NUMBER OF HOURS: 15+15	ECTS: 4
SEMESTER: summer	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basics of chemistry and physics
CONTENTS: Basic concepts of novel instrumentation in the analysis of environmental contaminants. Their possibilities and limitations.
EFFECTS OF EDUCATION PROCESS: Knowledge on possibilities and limitations methods which can be used in environmental analysis.
LITERATURE (OPTIONAL): K. Danzer Analytical Chemistry – Theoretical and Metrological Fundamentals, Springer, 2007; F. Rouessac, A. Rouessac, Chemical Analysis - Modern Instrumentation Methods and Techniques, Wiley, 2007
TEACHING METHODS: lectures, demonstrations, discussions, solving real problems of environmental analysis
ASSESSMENT METHODS: demonstrations at the Laboratory of Environmental Analyses
TEACHER (NAME, EMAIL CONTACT): Assoc. Prof. Ph.D., D.Sc. Jacek Czerwiński, j.czerwinski@wis.pol.lublin.pl



Microbiology of activated sludge – FEE17

FACULTY: Environmental Engineering	CLASS TYPE: lecture+lab
NUMBER OF HOURS: 15+15	ECTS: 4
SEMESTER: summer	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: general knowledge about biology, biochemistry
CONTENTS: Activated sludge, activated sludge composition, wastewater treatment plants, bacteria, protozoa, fungi, activated sludge processes.
EFFECTS OF EDUCATION PROCESS: ability to identify filamentous microorganisms and other morphological and functional groups of organisms in the activated sludge, ability to interpret results of experiments, knowledge about control of sludge bulking and biological unit processes in wastewater treatment plants
LITERATURE (OPTIONAL):
TEACHING METHODS: multimedia presentation, lecture, microscopic observations, laboratory experiments, demonstrations
ASSESSMENT METHODS: test of knowledge,
TEACHER (NAME, EMAIL CONTACT): Ph.D. Agnieszka Rozej, a.rozej@wis.pol.lublin.pl



Modelling of Wastewater Treatment Systems – FEE18

FACULTY: Environmental Engineering	CLASS TYPE: Lab (with computers)
NUMBER OF HOURS: 30	ECTS: 2
SEMESTER: summer	CLASS LEVEL: undergraduate/master

LANGUAGE OF INSTRUCTION: English
PRELIMINARY REQUIREMENTS: Basic knowledge of wastewater treatment processes.
CONTENTS: Basics of computer modelling, main models in wastewater treatment, use of modern modelling software package, application of selected dynamic models, interactive simulation as a tool to observe different relationships between key parameters in wastewater treatment processes, the effects of dynamic operation and control on the performance of wastewater treatment plants, simulation results analysis.
EFFECTS OF EDUCATION PROCESS: knowledge on various processes used in modern wastewater treatment; ability to indicate relationships between key parameters in wastewater treatment processes; knowledge on basics of computer modeling; ability to use modern computer simulation program; ability to build wastewater treatment plant models; ability to simulate various configurations of the system modeled; ability to evaluate the performance of the system; ability to modify the key parameters to enhance the efficiency of the wastewater treatment plant
LITERATURE (OPTIONAL):
TEACHING METHODS: short lecture with multimedia presentation plus students' own work on set topics
ASSESSMENT METHODS: final written report on simulation exercise
TEACHER (NAME, EMAIL CONTACT): Ph.D. Eng. Adam Piotrowicz, a.piotrowicz@wis.pol.lublin.pl