WBiIŚ

Faculty of Civil and Environmental Engineering

WEST POMERANIAN UNIVERSITY OF TECHNOLOGY
IN SZCZECIN, POLAND

THE OFFER FOR INTERNATIONAL STUDENTS
FOR THE YEAR 2023/2024
SECOND DEGREE

	Course title	Person responsible for the course	Semester (winter/summer)	ECTS points	Hours
1	Advanced Geoengineering	Zygmunt Meyer	winter/summer	2	30
2	Applied Construction Management	Magdalena Bochenek	winter	2	30
3	Applied Mathematics in Engineering	Bogdan Ambrożek	winter/summer	4	60
4	Complex Metal Structures	Wiesław Paczkowski	winter	3	30
5	Complex Metal Structures II	Agnieszka Pełka-Sawenko	summer	4	60
6	Computer Methods	Ewa Silicka	summer	2	30
7	Computer methods in municipal infrastructure analysis and design	Dorota Stocka	winter/summer	4	45
8	Computer Modelling and Simulation in Engineering	Bogdan Ambrożek	winter/summer	4	60
9	Cost Management in Construction 2	Magdalena Bochenek	summer	2	30
10	Ecological Engineering	Agata Markowska-Szczupak	winter/summer	4	60
11	Finite Element Method – Applications in Engineering	Bogdan Ambrożek	winter/summer	4	60
12	International Tender Management	Magdalena Bochenek	winter	2	30
13	Management of Building Projects	Magdalena Bochenek	winter	2	30
14	Purification of Gases and Atmosphere Protection	Jacek Przepiórski	winter/summer	2	30
15	Special Foundations Design	Andrzej Pozlewicz	winter/summer	5.0	90
16	Strategic Management in Construction	Agnieszka Siewiera	summer	3	60
17	Timber Structures	Szymon Skibicki	winter	2	45
18	Underground Structures	Krzysztof Żarkiewicz	summer	2	45

Course title	Advanced Geoengineering		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Zygmunt Meyer	**E-mail address to the person**	Zygmunt.Meyer@zut.edu.pl
Course code (if applicable)	WBiIS-2-03-WS	**ECTS points**	2
Semester	winter/summer	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	Familiarize the student with various foundation load systems, teach him how to design special foundation elements in complex geotechnical conditions		
Entry requirements	Advanced soil mechanics Basic of buliding mechanics		
Course contents	Project of the foundation of the building segment Cooperation of the slab with the pile system Box foundations Foundation of high objects under complex load conditions and difficult geotechnical conditions in category III (high buildings, masts, wind power towers) Designing foundations for machines Foundation of communication engineering objects (bridges, viaducts, embankments, deep excavations, underground constructions Foundation of hydrotechnical construction objects (wharfs, locks, weirs, breakwaters)		
Assessment methods	Information lecture method Case study lecture method Pracitical desing project method Countinous rating of student progress Final test rating		
Recommended readings	1. Chandrakant S. Desai, Musharraf Zaman, Advanced Geotechnical Engineering, Soil-Structure Interaction Using Computer and Material Models, CRC Press, 2013 2. P. K. Robertson, K.L. Cabal, Guide to cone penetration testing, Gregg, California, 2014, 6th 3. Braja M. Das., Introduction to Geotechnical Engineering, 1985		
Knowledge	Student has a thorough knowledge in the field of foundation of objects in variable load conditions and in complex geotechnical conditions. He knows the principles of constructing and dimensioning the foundations of complex structures and building objects.		
Skills	Is able to solve the problems of founding simple and complex buildings in difficult geotechnical conditions by integrating knowledge in the field of various branches of science related to construction		
Other social competences	Student is able to apply the knowledge used in the implementation of the engineering task undertaken in a responsible and professional manner		

Course title	Applied Construction Management		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Magdalena Bochenek	**E-mail address to the person**	Magdalena.Bochenek@zut.edu.pl
Course code (if applicable)	WBiIS-2-10-W	**ECTS points**	2
Semester	winter	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	Upon completion of this course the student will be able to use the applied tools and techniques of Construction Management during the construction stage of the project whilst developing management solutions for a variety of construction problems		
Entry requirements	Basic knowledge of construction technology and construction materials.		
Course contents	Case Studies of some construction management projects Construction procedures and strategies Building law in international perspective. Planning and control Lean construction Information management Environmental management Risk management in construction		
Assessment methods	Lecture, case studies continuous assessment written exam		
Recommended readings	1. Daniel W. Halpin, Bolivar A. Senior, Gunnar Lucko, Construction management, Wiley, 2017 2. Bochenek M., The mind mapping technique in project management, Creative Construction Conference 2019, Budapest, Hungary, 2019		
Knowledge	Student has the knowledge of tools and techniques of Construction Management during the construction stage of the project whilst developing management solutions for a variety of construction problems.		
Skills	Student is able to: analyze and control construction process		
Other social competences	Student is able in both professional and responsible way use gained knowledge and skills in executions works associated with construction management		

Course title	Applied Mathematics in Engineering		
Level of course	second cycle		
Teaching method	auditory class / lecture		
Person responsible for the course	Bogdan Ambrożek	**E-mail address to the person**	Bogdan.Ambrozek@zut.edu.pl
Course code (if applicable)	WBiIS-2-05-WS	**ECTS points**	4
Semester	winter/summer	**Language of instruction**	english
Hours per week	4	**Hours per semester**	60
Objectives of the course	The student will be able to: 1. Describe engineering problems in mathematical form. 2. Identify analytical solution to the differential equations. 3. Interpret the solution to differential equations.		
Entry requirements	Fundamentals of mathematics.		
Course contents	Formulation of engineering problems. Solution of ordinary differential equations. Solution of coupled Simultaneous ODE. Numerical solution of ODEs: initial value problems and boundary value problems. Analytical and numerical solution of PDEs. Solution of differential equations using Laplace transforms. Formulation of engineering problems. Modelling: model building process. Model hierarchy. Models with many variables. Boundary conditions. Vector spaces. Matrices. Matrix algebra: row operations, direct elimination methods, iterative methods. Ordinary differential equations. First-order equations. Solution methods for second-order nonlinear equations. Linear equations of higher order. Coupled Simultaneous ODE. The calculus of finite differences. Approximate methods for ODE solution. Initial value problems. Boundary value problems. Laplace transforms. Solution techniques for solving PDEs. Solution techniques for solving PDEs.		
Assessment methods	Lecture illustrated by Power Point presentation and manual and computer calculations Classes illustrated by computer and manual calculations Periodic assessment of student achievement Lecture: written test at the end of the semester Classes: written test		
Recommended readings	1. Dasgupta B., Applied Mathematical Methods, Pearson Education India, 2006 2. Riley K.F., M.P. Hobson M.P., Bence S.J., Mathematical methods for physics and engineering, Cambridge University Press, 2006 3. Hayek S. I., Advanced Mathematical Methods in Science and Engineering, CRC Press, 2010 4. Bayin S.S., Mathematical Methods in Science and Engineering, Wiley, 2006 5. Rice R.G., Do D.D., Applied mathematics and modeling for chemical engineers, Wiley, New York, 2012 6. Finlayson B.A., Introduction to chemical engineering computing, Wiley, New York, 2005 7. Loney N.W., Applied Mathematical Methods for Chemical Engineers, CRC, Boca Raton, 2015		
Knowledge	The student will be able to describe engineering problems in mathematical form.		
Skills	The student will be able to identify analytical and numerical solution to the differential equations.		
Other social competences	The student will be able to interpret the solution to differential equations.		

Course title	Complex Metal Structures		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Wiesław Paczkowski	**E-mail address to the person**	Wieslaw.Paczkowski@zut.edu.pl
Course code (if applicable)	WBiIS-2-07-W	**ECTS points**	3
Semester	winter	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	Ability to design complex metal structures		
Entry requirements	Knowledge of the main mechanical and technological properties of steel and aluminum alloys and the basic range of steel products; ability to design and construct simple steel elements (beams, columns, bearings); knowledge of the basic design principles of steel halls.		
Course contents	Design of single-shell steel smoke chimney or vertical-cylindrical tank for liquid fuels. Evaluating of the limit states and drawings preparation (assembly, workshop section, selected construction and assembly details) Fracture and Fatigue Control in Steel Structures Steel shell structures: chimneys, tanks - basic principles of calculation and construction. Non-technical aspects of the design and construction of steel structures		
Assessment methods	Lecture Project Passing the controlled assignment Passing the exam		
Recommended readings	1. Darko Beg, Ulrike Kuhlmann, Laurence Davaine, Benjamin Braun, Design of Plated Structures: Eurocode 3: Design of Steel Structures, Part 1-5: Design of Plated Structures, Wiley, Berlin, 2010 2. A. Pełka-Sawenko, T. Wróblewski, M. Abramowicz , M. Szumigała, Damage detection of steel-concrete composite beam, Civil and Environmental Engineering Reports, 2011, Volume 28, 3, DOI: 10.2478/ceer-2018-0033		
Knowledge	The student is able to distinguish and define forms of destruction of steel construction elements. The student is able to define types of steel shell constructions and propose their correct construction solutions using appropriate standards and technical standards.		

Course title	Complex Metal Structures II		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Agnieszka Pełka-Sawenko	**E-mail address to the person**	Agnieszka.Pelka-Sawenko@zut.edu.pl
Course code (if applicable)	WBiIS-2-08-S	**ECTS points**	4
Semester	summer	**Language of instruction**	english
Hours per week	4	**Hours per semester**	60
Objectives of the course	Ability to design complex metal structures objects Developing skills of independent solving of problems related to steel construction		
Entry requirements	Passed Complex Metal Structures		
Course contents	Design of a steel flyover with EOT crane. Evaluating of the limit states and drawings preparation (assembly, workshop section, selected construction and assembly details) Principles design of complex metal structures: - steel halls (Calculation of spatial systems, building and assembly of the structure) - flyover and EOT crane - large-span structures		
Assessment methods	Lecture Project Passing the exam Passing the controlled assignment		
Recommended readings	1. Biegus A., Steel hall buildings, Arkady, warszawa, 2003 2. Kucharczuk W. Labocha S., Steel halls. Designer's guide, Polskie Wydawnictwo Techniczne, 2012 3. Łubiński M., Metal structures, cz II, Arkady, Warszawa, 2004 4. Matysiak A., Steel Construction: EOT Crane beams, flyovers, PWN, Warszawa-Poznań, 1994 5. Giżejowski M., General construction, t5, Steel structures of buildings, design by Eurocodes with examples, Arkady, Warszawa, 2010 6. A. Pełka-Sawenko, T. Wróblewski, M. Abramowicz , M. Szumigała, Damage detection of steel-concrete composite beam, Civil and Environmental Engineering Reports, Poznań, 2019, Volume 28, 3, DOI: 10.2478/ceer-2018-0033		
Knowledge	The student is able to distinguish and define and identity certain complex objects of metal construction (halls, flyovers, large span covers) propose their construction and technological solutions ensuring an appropriate level of security and technological.		

Course title	Computer Methods		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Ewa Silicka	**E-mail address to the person**	Ewa.Silicka@zut.edu.pl
Course code (if applicable)	WBiIS-2-14-S	**ECTS points**	2
Semester	summer	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	Acquaintance with popular numerical methods according to static analysis of engineering structures Ability to proper numerical definition and analysis of engineering structures by commercial systems		
Entry requirements	Passed course of mathematic		
Course contents	Manual of the software Analysis of plate bar system by Matrix Displacement Methods. Analysis of plate stress state structure with the use of commercial system; influence of mesh density on results improvement Analysis of plate with the use of commercial system Analysis of cylindrical shell with the use of commercial system; comparison of the numerical and theoretical results Revision of the Matrix Displacement Method The theory of static linear analysis of structural systems by Finite Element Method Test		
Assessment methods	Lectures Laboratory tutorials Mark of the final test Evaluation of the assignments		
Recommended readings	1. Cook R. D., Malkus D. S., Plesha M. E., Witt R. J., Concepts and Applications of Finite Element Analysis, Wiley, 2002 2. Desei C. S., Abel J. F., Introduction to the Finite Element Method, VNR, New York, 1987 3. Zienkiewicz O. C., The Finite Element Method in Engineering Science, McGraw-Hill, London, 1971		
Knowledge	Students knows and understands algorithm of Finite Element Method in accordance with linear static analysis of engineering structures		
Skills	Student is able to define and analyse engineering structures with the use of commercial systems		
Other social competences	Student understands responsibility for the professionally made calculations		

Course title	Computer methods in municipal infrastructure analysis and design		
Level of course	second cycle		
Teaching method	project		
Person responsible for the course	Dorota Stocka	**E-mail address to the person**	Dorota.Stocka@zut.edu.pl
Course code (if applicable)	WBiIS-2-01-WS	**ECTS points**	4
Semester	winter/summer	**Language of instruction**	english
Hours per week	3	**Hours per semester**	45
Objectives of the course	Understanding the practical application of various computer methods and software in civil/municipal infrastructure (water supply, sanitary sewage and storm drainage) design, modelling and analysis. Understanding the need for computer modeling simulation in civil and environmental engineering design and municipal utylity management. Understanding equitation-solving software and modelling processes. Understanding the input data and output results.		
Entry requirements	Advanced Hydrology and Hydraulics Fluid Mechanics (open channels and closed pipe systems) Design of water and sewerage systems		
Course contents	Review and hands-on experience of computer methods, engineering applications and software programs available in civil engineering industry for municipal utility design (water supply, sewage and storm water systems). Hands-on experience with computer methods and software applications for civil engineers		
Assessment methods	Project preparation with the use of computer and software Obtaining grade for project work		
Recommended readings	1. Walski Thomas, Chase Donald, Savic Dragan, Water distribution modeling., Headstad Methods - Watrbury Headstad Press, 2001 2. Durrans Rocky, Stormwater conveyance, modeling and design, Headstad Methods - Waterbury Headstad Press, 2003		
Skills	Upon successful completion of this course, the student will be able to: - build a computer model of storm and sanitary sewer system with the applicstion of basic municipal/national design criteria - perform a hydrodynamic simulation of the model - prepare and print a report		

Course title	Computer Modelling and Simulation in Engineering		
Level of course	second cycle		
Teaching method	auditory class / lecture		
Person responsible for the course	Bogdan Ambrożek	**E-mail address to the person**	Bogdan.Ambrozek@zut.edu.pl
Course code (if applicable)	WBiIS-2-15-WS	**ECTS points**	4
Semester	winter/summer	**Language of instruction**	english
Hours per week	4	**Hours per semester**	60
Objectives of the course	The student will be able to: 1. Formulate a mathematical models of engineering systems. 2. Carry out computer simulations of engineering systems using programming languages and commercial programs. 3. Understand and interpret the results of computer simulations.		
Entry requirements	Fundamentals of mathematics.		
Course contents	Derivation of mathematical models of selected engineering systems. Computer simulation of engineering systems using selected programming languages (Fortran, C++, Python). Computer simulation of engineering systems using selected commercial programs (Matlab, Mathematica, Polymath). Introduction to mathematical modeling and simulations. Model building process. Model hierarchy. Models with many variables. Boundary conditions. Classification of Mathematical Models. Mechanistic Models: ODEs Mechanistic Models: PDEs. Accuracy of models. Kinds of computer simulations Constituents of computer simulations: specifications, algorithms, computer processes. Programming Language and Software Environment.		
Assessment methods	Lecture illustrated by Power Point presentation and computer calculations. Classes illustrated by computer calculations. Periodic assessment of student achievement Lecture:written test at the end of the semester Classes: written test		
Recommended readings	1. Velten K., Mathematical Modeling and Simulation. Introduction for Scientists and Engineers, WILEY-VCH, Weinheim, 2009 2. Duran J.M., Computer simulations in science and engineering., Springer, 2018 3. Banerjee S., Mathematical Modeling. Models, Analysis and Applications, CRC, Boca Raton, 2014 4. Herrera I., Pinder G.F., Mathematical modeling in science and engineering: an axiomatic approach, Wiley, Hoboken, 2012 5. Basmadjian D., The art of modeling in science and engineering, CRC, Boca Raton, 2000 6. Rice R.G., Do D.D., Applied mathematics and modeling for chemical engineers, Wiley, New York, 2012 7. Finlayson B.A., Introduction to chemical engineering computing, Wiley, New York, 2005		
Knowledge	The student will be able to formulate a mathematical models of engineering systems.		
Skills	The student will be able to carry out computer simulations of engineering systems using programming languages and commercial programs.		
Other social competences	The student will be able to understand and interpret the results of computer simulations.		

Course title	Cost Management in Construction 2		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Magdalena Bochenek	**E-mail address to the person**	Magdalena.Bochenek@zut.edu.pl
Course code (if applicable)	WBiIS-2-12-S	**ECTS points**	2
Semester	summer	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	Upon completion of this course the student will be able to manage the construction cost effectively and accountably		
Entry requirements	Basic knowledge of construction technology and construction materials		
Course contents	Cost management using software Introduction to international cost management International best practices Simulation techniques for cost management Managing risks within the project cost Value management Cost control and monitoring procedures		
Assessment methods	Lecture, case studies continuous assessment written exam		
Recommended readings	1. K. Potts, N.Ankrah, Construction cost management, Routledge, 2017 2. Araszkiewicz K., Bochenek M., Control of construction projects using the Earned Value Method - case study, De Gruyter, 2019		
Knowledge	Student has the knowledge of managing the construction cost effectively and accountably.		
Skills	Student is able to: analyse and control the cost for various cases.		
Other social competences	Student is able in both professional and responsible way use gained knowledge and skills in executions works associated with cost management.		

Course title	Ecological Engineering		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Agata Markowska-Szczupak	**E-mail address to the person**	Agata.Markowska@zut.edu.pl
Course code (if applicable)	WBiIS-2-16-WS	**ECTS points**	4
Semester	winter/summer	**Language of instruction**	english
Hours per week	4	**Hours per semester**	60
Objectives of the course	Promote an understanding of the principles of Green Engineering and Industrial Ecology Develop an understanding of the interdisciplinary and multidisciplinary nature of environmental problems related to engineering; Design solutions to address environmental problems related to engineering; Enhance students' awareness of the broad environmental, social and economic impact of engineering		
Entry requirements	Background in engineering at university level is required. Principles of biology, chemistry, physics		
Course contents	Environmental Engineering Science Projects on varied subjects. The term project will consist of a detailed review of two (2) scientific journal articles. Identify a scientific journal article which includes elements of microbiology and environmental engineering; submit a review paper for each article and a copy of each selected article at the end of semester. Elements of ecology: System, open system, closed system, definition of ecology, species, population, community, definition of ecosystem- components types and function. Principles of Green Engineering Monitoring of air, water and soil pollutants. Strategies to reduce the environmental impact Replacement of classical products to biotechnological stocks eg biopolymers, biofertilzers. biochemical etc. Principles, methods, advantages, and limitations of bioremediation processes Sustainable biofuels Catalysts for Environmental Applications Pro-ecological technologies and products Restoration and protection of urban environment		
Assessment methods	lectures with presentations private study, working through the course as presented in lectures, tutorials and learning materials evaluation of knowledge and engagement in discussion during lectures written test - grade from lectures		
Recommended readings	1. Scrag A., Environmental Biotechnology, Oxford: Oxford University Press, Oxford, 2005, 2nd 2. Juniper T., The Ecology Book: Big Ideas Simply Explained Hardcover, DK PUB, 2019, 1st 3. Kulkarni, S.; Kanwar Rawat, N.; Haghi, A.K., Green Chemistry and Green Engineering Processing, Technologies, Properties, and Applications, Routledge, Taylor and Francis Grup, 2021 4. Schneiter R.W., Environmental Engineering Solved Problems,, PPI, A Kaplan Company, 2012, 3th		
Knowledge	Student has knowledge about environmental pollutants, processes, devices and technologies used in environmental protection. Understand and describe important physical, chemical, and biological processes that affect ecosystem integrity		
Skills	Analyze and illustrate the impact that designing ecosystems to solve engineering problems has in the context of societal and global issues Student is able to collect and interpret data from lliterature, prepare presentation		
Other social competences	Student is able to perform all tasks on time, cooperate and work in group		

Course title	Finite Element Method – Applications in Engineering		
Level of course	second cycle		
Teaching method	auditory class / lecture		
Person responsible for the course	Bogdan Ambrożek	**E-mail address to the person**	Bogdan.Ambrozek@zut.edu.pl
Course code (if applicable)	WBiIS-2-06-WS	**ECTS points**	4
Semester	winter/summer	**Language of instruction**	english
Hours per week	4	**Hours per semester**	60
Objectives of the course	The student will be able to: 1. Use of FEM to solve engineering problems. 2. Understand how the FEM algorithms work.		
Entry requirements	Mathematics		
Course contents	Problems related to mass transfer. Problems related to heat transfer. Problems in fluid mechanics. Problems in Structural Dynamics Problems in Rock Mechanics Problems in soil mechanics. An introduction to FEM Fundamentals of discretization and approximation functions Finite element equations based on the method of weighted residuals and on the principle of minimum potential energy Linear structural analysis. Linear analysis of field problems. Nonlinear structural analysis Introduction to computer programming aspects of the finite element method. Applications of FEM in engineering. Example problems and solutions.		
Assessment methods	Lecture illustrated by Power Point presentation and computer simulation Classes illustrated by computer calculations. Periodic assessment of student achievement Lecture: written test at the end of the semester Classes: written test		
Recommended readings	1. E. Madenci, Guven I., The Finite Element Method and Applications in Engineering Using Ansys®, Springer, Berlin, 2003 2. Quek S. S., Liu G.R., The Finite Element Method: A Practical Course, Butterworth-Heinemann, 2006 3. Zhu B., The Finite Element Method: Fundamentals and Applications in Civil, Hydraulic, Mechanical and Aeronautical Engineering, Wiley, 2018 4. Akin J. E., Finite element analysis with error estimators: an introduction to the FEM and adaptive error analysis for engineering students, Elsevier/Butterworth-Heinemann, 2005 5. Heinrich J.C., Pepper, D.W., The finite element method : basic concepts and applications with MATLAB, MAPLE, and COMSOL, CRC, 2017		
Knowledge	The student knows the FEM algorithms		
Skills	The student will be able to use FEM in engineering.		
Other social competences	The student will be able to use of FEM to solve engineering problems.		

Course title	International Tender Management		
Level of course	second cycle		
Teaching method	auditory class / lecture		
Person responsible for the course	Magdalena Bochenek	**E-mail address to the person**	Magdalena.Bochenek@zut.edu.pl
Course code (if applicable)	WBiIS-2-09-W	**ECTS points**	2
Semester	winter	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	Upon completion of this course the student will be able to manage the international tender process effectively and accountably.		
Entry requirements	Basic knowledge of construction technology and construction materials		
Course contents	Case studies: international tendering Introduction to international tendering. Building law in tendering procedures. Developing a modern tender process Pre-Qualification of bids E-portals in tender process International best practices Tender evaluation proces and offer selection Managing risks within the bid and tender processes International Contract Conditions		
Assessment methods	Lecture, case studies continuous assessment written exam		
Recommended readings	1. T. Brandt, S. TH. Franssen, Basics tendering, Birkhauser, 2017 2. Bochenek J., The selection criteria for appointing the contractor for building works in public procurement process in selected eu countries, Budownictwo Zeszyt 2-B (6) 2014, 2014 3. Bochenek M., The mind mapping technique in project management, Creative Construction Conference 2019, Budapest, Hungary, 2019		
Knowledge	Student has the knowledge of managing the international tender process effectively and accountably.		
Skills	Student is able to: analyze modern tender process for various case		
Other social competences	Student is able in both professional and responsible way use gained knowledge and skills in executions works associated with international tendering		

Course title	Management of Building Projects		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Magdalena Bochenek	**E-mail address to the person**	Magdalena.Bochenek@zut.edu.pl
Course code (if applicable)	WBiIS-2-11-W	**ECTS points**	2
Semester	winter	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	Upon completion of this course the student will be able to recognize project management procedures along with tools used to plan, manage, organize, monitor, and control a project		
Entry requirements	Basic knowledge of construction technology and construction materials.		
Course contents	Case study: management of building project based on selected examples Introduction and course requirements. Safety measures on building site, individual and staff safety. Project management methodology: PRINCE2, Waterfall, and Agile. Building law in project management. Project phases: strategy phase, planning phase, realization phase, closure phase Mind Mapping for Project Management CPM and CCPM methodology Case study in project scheduling		
Assessment methods	Lecture, case studies continuous assessment final exam		
Recommended readings	1. M.D.Alam, U.F.Guehl, Project-management in practise. A quideline and toolbox for successful projects, Springer, 2017 2. Magdalena Bochenek, The mind mapping technique in project management, Creative Construction Conference 2019, Budapest, Hungary, 2019		
Knowledge	Student has the knowledge of project management methodology and processes		
Skills	Student is able to: analyze and control construction process		
Other social competences	Student is able in both professional and responsible way use gained knowledge and skills in executions works associated with management of building project		

Course title	Purification of Gases and Atmosphere Protection		
Level of course	second cycle		
Teaching method	auditory class / lecture		
Person responsible for the course	Jacek Przepiórski	**E-mail address to the person**	Jacek.Przepiorski@zut.edu.pl
Course code (if applicable)	WBiIS-2-17-WS	**ECTS points**	2
Semester	winter/summer	**Language of instruction**	english
Hours per week	2	**Hours per semester**	30
Objectives of the course	To get a knowldege on the practicall methods and technologies used to purify gases from various sources prior releasing to atmosphere		
Entry requirements	Basics of chemistry or chemical enginnering		
Course contents	Calculationss on topics from the lecture: SOx and NOX elimination from flue gases, methods of other gases arresting from industrial fluxes Processes releasing harmful gases, sources of sulfur and nitrogen in fuels, generation of SO2 upon combustion of fuels Industrial methods for SO2 removal from flue gases (DeSOx). Formation of nitrogen oxides upon combustion of fuels, technologies for NOx removal (DeNOx) from flue gases. Other methods and technologies for purification of air and other gases including H2S arresting.		
Assessment methods	Lecture Oral exam, continous assesment		
Recommended readings	1. Zevenhoven, R., Kilpinen, P., CONTROL OF POLLUTANTS IN FLUE GASES AND FUEL GASES, 2011, Available at: http://users.abo.fi/rzevenho/gasbook.html		
Knowledge	You will know and understand some chemical processes, particalurarly related to releasing of hazardous gases. You will know porocesses used to clean the gases before releasing to the atmosphere.		
Skills	W wyniku przeprowadzonych zajęć student powinien umieć dobrać metodę oczyszczania gazu do jego składu		
Other social competences	W wyniku przeprowadzonych zajęć student nabędzie następujące postawy: dbałość o środowisko, świadomość zagrożeń, zdolność do zdecydowania o potrzebie oczyszczania gazów przemysłowych.		

Course title	Special Foundations Design		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Andrzej Pozlewicz	**E-mail address to the person**	Andrzej.Pozlewicz@zut.edu.pl
Course code (if applicable)	WBiIS-2-02-WS	**ECTS points**	5.0
Semester	winter/summer	**Language of instruction**	english
Hours per week	6	**Hours per semester**	90
Objectives of the course	Create an ability to recognize and use of proper foundation in case of massive construction and complex load systems Create an ability to prepare a geotechnical design of special foundation		
Entry requirements	Completed course of soil mechanics Completed course of engineering geology Completed course of foundations design Completed course of structural mechanics		
Course contents	Design of special foundation in complex geotechnical conditions Advanced geotechnical aspects in special foundation design Load transfer mechanism in pile, pier and shaft foundation Meyerhof's method for bored and displacement driven piles "Alpha", "lambda" and "beta" methods for shafts and piers Elastic foundation Test loads, Davisson formulae Negative skin friction, neutral depth (Vesic, Bowles) Group of piles, drilled shafts - technology and design Brich Hansen method for lateral loading (free and fixed head) Soil spring idealization, elastic continuum model (Poulos, Reese and Matlock, Broms approaches) Anchoring systems in special foundation design		
Assessment methods	Project based learning method Lecture, case studies Project work continuous assessment Project presentation and defence		
Recommended readings	1. Bowles J. E., Foundation Analysis and Design, McGraw-Hill, 1996, Knovel Release Date 2007-01-02 2. Budhu M., Soil Mechanics and Foundations, John Wiley & Sons, 2007, Knovel Release Date: Aug 5, 2009, Earth Sciences 3. Day R. W., Foundation Engineering Handbook - Design and Construction with the 2006 International Building Code, McGraw-Hill, 2006, Knovel Release Date: 2006-08-09 4. Cernica J. N., Geotechnical Engineering: Foundation Design, John Wiley & Sons, New York, 1995 5. Smith I., Smith's Elements of Soil Mechanics. 8th Edition. Design to Eurokode 7, Blackwell Publishing, Oxford, 2006, 8, VIII-114 6. Tomlinson M. J., Foundation Design and Construction, Prentice Hall, Harlow, 2001, 7 7. Monahan E. J., Construction of Fills, John Wiley & Sons, 1994, 2, Knovel Release Date: 2007-08-22 8. Cashman P. M., Preene M., Groundwater Lowering in Construction. A practical guide, Spon Press, London, New York, 2001 9. Venkatramaiah C., Geotechnical Engineering, John Wiley & Sons, 1993		
Knowledge	Student knows systems of modern foundations design in case of not standard construction		
Skills	Student is able to: analyse geotechnical solutions for various special foundations, provide comparative analysis for given solutions, make calculations of bearing capacity of a special foundation		
Other social competences	Student is able in both professional and responsible way use gained knowledge and skills in executions works associated with special foundations engineering. Understands the engineering activities effect on environment		

Course title	Strategic Management in Construction		
Level of course	second cycle		
Teaching method	auditory class / lecture		
Person responsible for the course	Agnieszka Siewiera	**E-mail address to the person**	Agnieszka.Siewiera@zut.edu.pl
Course code (if applicable)	WBiIS-2-14-S	**ECTS points**	3
Semester	summer	**Language of instruction**	english
Hours per week	4	**Hours per semester**	60
Objectives of the course	To be able to differentiate basic theories from strategic management, to discuss them, to conduct analyses on industry forces and business model conceptions and to scrutinize selected issues of modern top management		
Entry requirements	Knowledge of the basics of management		
Course contents	Preparation of the macro-environment analysis of the selected company Preparation of the chosen company's strategy Case studies – strategies of selected companies from construction industry Marketing plan for a selected company from the construction industry Introduction to the course: Competitive advantages and business models Review of the main schools of thought about strategy making Developing new business models Corporate diversification: The concept of relatedness Industry analysis and new business models in the construction industry Strategic and cultural change – the case studies Developing and implementing sustainable strategies (and business models) The role of top management teams Supply chain analysis. Techniques for strategic planning. Marketing in construction industry – international aspects		
Assessment methods	Informative lecture, explanation case studies project based learning method written test project appraisal		
Recommended readings	1. Langford D. and Retik A., The Organization and Management of Construction: Shaping theory and practice, Routledge, 2002 2. Lester A., Project management, planning and control: managing engineering, construction and manufacturing projects to PMI, APM and BSI standards, Elsevier, 2006		
Knowledge	The student knows and understands the basic concepts and methods of managing a strategic construction company		
Skills	The student can apply methods of analysis of the environment and analysis of enterprise resources		
Other social competences	The student is ready to solve creatively strategic problems and decision making in a construction company		

Course title	Timber Structures		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Szymon Skibicki	**E-mail address to the person**	Szymon.Skibicki@zut.edu.pl
Course code (if applicable)	WBiIS-2-13-W	**ECTS points**	2
Semester	winter	**Language of instruction**	polish
Hours per week	3	**Hours per semester**	45
Objectives of the course	Basic knowledge of timber structural engineering Basic knowledge of European Standards for timber structures		
Entry requirements	Strength of materials (basic)		
Course contents	Design and detailing of glued lamined timber building. Introduction to glued laminated timber structure. The structure of glued laminated timber. Characteristics of glued laminated timber. Mechanical and technological properties. Types of glued laminated timber structure. Eurocodes (general structure, Basis of structural design and design of glued laminated timber structures). Design of basic glued lamited timber elements. Design of cross-sections subjected to combined stresses. Stability of members. Serviceability limit states in glued laminated timber structures. Design of Connections for glued lamined timber structures.		
Assessment methods	Lectures Design workshop Written test Project works		
Recommended readings	1. Ozelton, E.C., Baird, J. A., Timber Designers' Manual, Blackwell Publishing, 2006 2. Porteous, J., Kermani, A., Structural Timber Design to Eurocode 5, Blackwell Publishing, 2007 3. EN 1990: Eurocode - Basis of structural design, 2011 4. Eurocode 1: Actions of structures, parts: EN 1991-1-1; EN 1991-1-3; EN 1991-1-4, 2011 5. EN 19951-1: Eurocode 5: Design of timber structures, 2011		
Knowledge	Student knows European Standards for timber structures		
Skills	Student can set up the loading acting on structre according to European Standards Student can design of simple timber structure		
Other social competences	Student understand the rule of design of timber structures		

Course title	Underground Structures		
Level of course	second cycle		
Teaching method	project / lecture		
Person responsible for the course	Krzysztof Żarkiewicz	**E-mail address to the person**	Krzysztof.Zarkiewicz@zut.edu.pl
Course code (if applicable)	WBiIS-2-18-S	**ECTS points**	2
Semester	summer	**Language of instruction**	english
Hours per week	3	**Hours per semester**	45
Objectives of the course	Acquainting the student with complex problems of designing of the underground structures		
Entry requirements	Basic of soil mechanics and geotechnical engineering		
Course contents	Design exercises from underground structures. Soil/rock pressure calculations. Designing in stages of underground structure. Introduction to undeground structures. Types of undeground structures. Shape of the cross section. Excavation and support systems. Methods of tunneling and underground structures constructions. Opencast methods. Excavation methods. New Austrian Tunneling Method. Continuous mechanised tunneling: TBM technologies. Rock behaviour in tunneling design. Monitoring and risk management in underground constructions. Safety and ventilation of tunnels. Technical infrastructure, lighting, monitoring. Tunnel designing. Soils and rocks pressure on support systems. Socio-economic advantages of udergrounds structures. Tunnels impact on the environment. Test		
Assessment methods	Lectures method Project design method Countinous rating of student progress Test Test exam		
Recommended readings	1. Pietro Lunardi, Design and construction of tunnels, Springer-Verlag Berlin Heidelberg, Italy, 2008 2. Otis Williams, Engineering and Design TUNNELS AND SHAFTS IN ROCK, Department of the Army U.S. Army Corps of Engineers Washington, Washington, 1997 3. ITA WG Mechanized Tunnelling, Recommendations and Guidelines for Tunnel Boring Machines (TBMs), by ITA - AITES, www.ita-aites.org, 2000 4. John A. Hudson, John P. Harrison, Engineering Rock Mechanics. An Introduction for the Principles, ELSEVIER SCIENCE, Amsterdam - Lausanne - New York - Oxford - Shannon - Singapore - Tokyo, 1997 5. Zhen Dong Cui et al., Design of Underground Structures, Springer, Beijing, China, 2020		
Knowledge	The student knows and understands solve complex geotechnical problems by himself by extending his knowledge about soil and rock mechanics and underground structures		
Skills	Student can design the underground structures in complex geotechnical conditions		
Other social competences	Is ready to work with a group to achieve the desired engineering effect.		